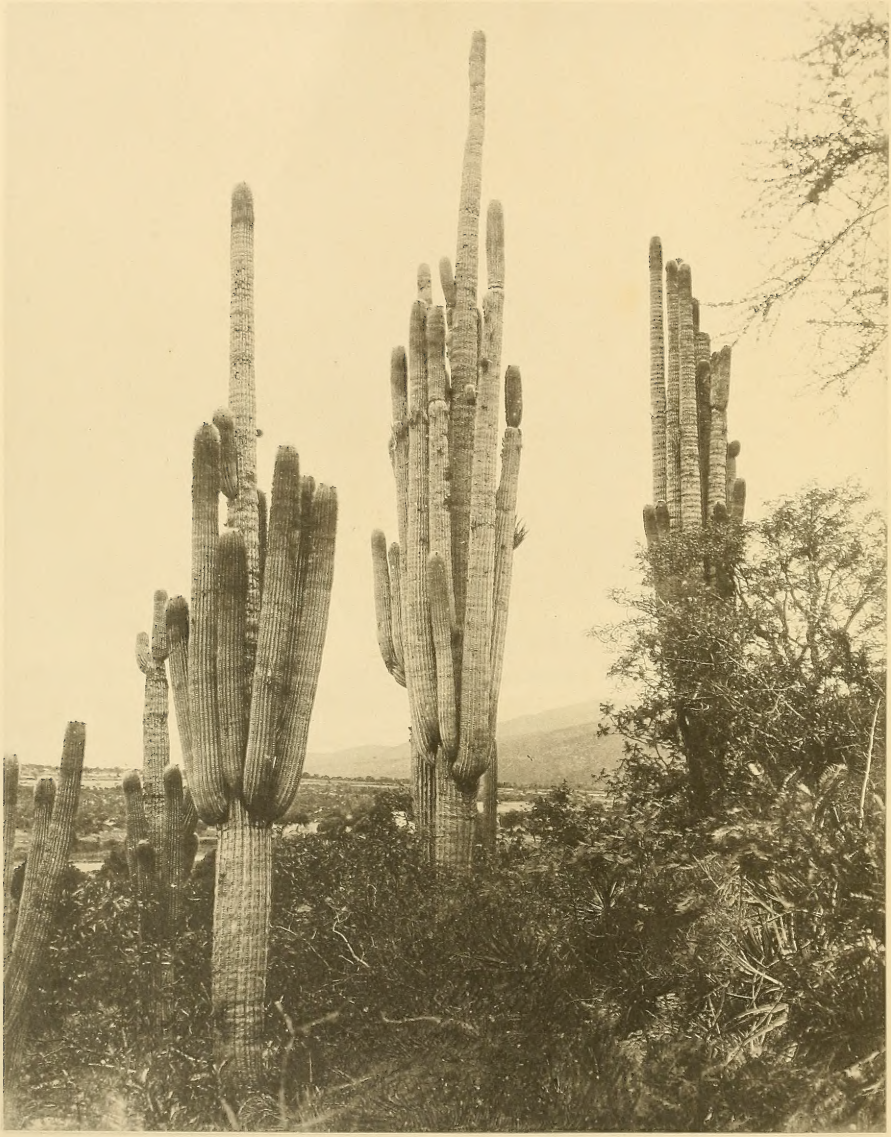

A group of plants of *Cephalocereus macrocephalus* on a forest-covered hillside near Tehuacán, Mexico.

THE CACTACEAE

DESCRIPTIONS AND ILLUSTRATIONS OF PLANTS OF THE CACTUS FAMILY

BY

N. L. BRITTON AND J. N. ROSE

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THE CACTACEAE

Descriptions and Illustrations of Plants of the Cactus Family

NEW YORK
BOTANICAL
GARDEN

DESCRIPTIONS AND ILLUSTRATIONS OF PLANTS OF THE CACTUS FAMILY.

Tribe 3. CEREEAE.

Plants more or less fleshy, terrestrial or epiphytic, simple and 1-jointed or much branched and many-jointed, the joints globular, oblong, cylindric, columnar or flattened, and winged or leaf-like, often strongly ribbed, angled, or tubercled; leaves* usually wanting on the joints (in a few cases developing as scales) but usually developing as scales on the ovary or perianth-tube; areoles never producing glochids; spines usually present (rare or wanting in most epiphytic genera and in a few species of other genera), various in color, structure, arrangement, and size, never sheathed; flowers sessile, mostly with a definite tube, various in size and shape in different genera, usually solitary at areoles, opening at various times of the day; perianth campanulate, funnelform or rotate; fruit usually a fleshy berry, but sometimes dry and dehiscing by a basal pore (in 1 species by an operculum); seeds usually small, brown or black, with a thin, more or less brittle testa; cotyledons usually minute knobs.

This tribe contains most of the genera and three-fourths or more of the species of *Cactaceae*. It has a wider range in structure of stems and flowers than is exhibited by the other tribes, the species being grouped in many genera. The first two subtribes are treated in this volume.

Key to Subtribes.

Perianth funnelform, salverform, tubular, or campanulate; segments several or many.
- Areoles mostly spine-bearing; joints ribbed, angled, or tubercled, very rarely flat; mostly terrestrial cacti.
  - Flowers and spines borne at the same areoles.
    - Several-jointed to many-jointed cacti, the joints long.
      - Erect, bushy, arching, or diffuse cacti ..... 1. *Cereanae*
      - Vine-like cacti, with aërial roots ..... 2. *Hylocereanae*
    - One-jointed or few-jointed cacti, the joints usually short, sometimes clustered, ribbed, or rarely tubercled.
      - Flowers at lateral areoles ..... 3. *Echinocereanae*
      - Flowers at central areoles (See *Gymnocalycium*) ..... 4. *Echinocactanae*
  - Flowers and spines borne at different areoles; short, one-jointed cacti.
    - Flowering areoles forming a central terminal cephalium ..... 5. *Cactanae*
    - Flowering areoles at the bases or on the sides of the tubercles ..... 6. *Coryphanthanae*
- Areoles mostly spineless; joints many, long, flat; perianth mostly funnelform; epiphytic cacti. 7. *Epiphyllanae*

Perianth rotate, or nearly so; segments few; mostly spineless, epiphytic, slender, many-jointed cacti. 8. *Rhipsalidanae*

Subtribe 1. CEREANAE.

Erect, bushy or sometimes diffuse, stout or slender cacti, the stems and branches several-jointed to many-jointed, usually very spiny, none epiphytic but species of 2 or 3 genera giving off a few roots when the branches touch the ground; flowers 1 or rarely several from the upper part of old areoles; in some genera the flowering areoles and their spines greatly modified; flowers either diurnal or nocturnal, various in size, color, and shape; stamens numerous, borne on the flower-tube; fruit smooth or spiny, usually fleshy, often edible; seeds various.

We group the species known to us in 38 genera.

Key to Genera.

A. Flowers solitary at the areoles, mostly large.
- B. Perianth funnelform, salverform, pyriform, or campanulate; limb relatively large.
  - C. Ovary naked, or rarely bearing a few scales, which sometimes subtend tufts of short hairs.
    - Perianth funnelform, elongated.
      - Columnar cacti, or with columnar branches; perianth falling away by abscission ..... 1. *Cereus* (p. 3)
      - Slender, elongated cacti; perianth withering-persistent ..... 2. *Monvillea* (p. 21)
    - Perianth short-campanulate or short-funnelform to pyriform; columnar cacti ..... 3. *Cephalocereus* (p. 25)

*Plants of the tribe *Cereeae* are usually said to be without leaves. Ganong, however, reports leaves in *Cactus*, *Echinocactus*, and *Cereus*, but we have never seen leaves on any plants of *Cereus* proper. However, they are easily observed on young growth of various species of *Harrisia*, *Acanthocereus*, *Nyctocereus*, *Selenicereus*, *Hylocereus*, and some other genera.

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Key to Genera—continued.

CC. Ovary squamiferous, often also laniferous, setiferous, or spiniferous.
Flowers in a large lateral pseudocephalium; columnar cacti ..... 4. *Espostoa* (p. 60)
Plants without a pseudocephalium.
Ovary squamiferous only; columnar cacti.
Scales of the ovary fleshy.
Flower short-funnelform; scales of ovary and flower-tube acute ..... 5. *Browningia* (p. 63)
Flower long-funnelform; scales of ovary and flower-tube broad, abruptly cuspidate ..... 6. *Stetsonia* (p. 64)
Scales of the ovary papery ..... 7. *Escontria* (p. 65)
Ovary squamiferous and also laniferous, felted, or spiniferous.
Perianth short-campanulate or short-funnelform, its tube short or thick.
Plants mostly stout, columnar, and erect, ribbed or angled; a few species spreading or prostrate; rootstocks not tuberous.
Corolla short-campanulate.
Corolla falling away by abscission, yellow; columnar cacti .... 8. *Corryocactus* (p. 66)
Corolla withering-peristent; flowers not yellow.
Fruit dry; columnar cacti ..... 9. *Pachycereus* (p. 68)
Fruit a fleshy berry.
Tree-like, or bushy cacti ..... 10. *Leptocereus* (p. 77)
Columnar cacti ..... 11. *Eulychnia* (p. 82)
Corolla short-funnelform; fruit fleshy.
Mostly columnar cacti with stout stems, the white to pink flowers not widely expanded ..... 12. *Lemaireocereus* (p. 85)
Slender or low cacti, with bright red, scarlet, or yellow, widely expanded flowers.
Branches slender, few to several-ribbed ..... 13. *Erdisia* (p. 104)
Branches stout, closely many-ribbed ..... 14. *Bergerocactus* (p. 107)
Stems very slender, nearly terete or with many low ribs.
Inner perianth-segments much shorter than tube ..... 15. *Leocereus* (p. 108)
Inner perianth-segments as long as tube; rootstocks tuberous ... 16. *Wilcoxia* (p. 110)
Perianth funnelform, funnelform-campanulate, or salverform.
Areoles of the ovary spinuliferous or setiferous (see *Harrisia*).
Slender cacti, with an enormous fleshy root; flower salverform .. 17. *Peniocereus* (p. 112)
Stout or slender cacti, without a large fleshy root; flower funnelform.
Tree-like cacti; fruit with a thick woody rind; ovary few-spined . 18. *Dendrocereus* (p. 113)
Prostrate or bushy or vine-like cacti; fruit fleshy.
Stout, bushy or prostrate cacti, the spines dagger-like, flat .. 19. *Machaerocereus* (p. 114)
Slender or weak cacti, the spines acicular or subulate.
Perianth-tube as long as the limb or longer; elongated cacti with white flowers.
Joints ribbed.
Perianth-segments and filaments elongated ..... 20. *Nyctocereus* (p. 117)
Perianth-segments and filaments short ..... 21. *Brachycereus* (p. 120)
Joints angled ..... 22. *Acanthocereus* (p. 121)
Perianth-tube mostly shorter than the limb; bushy cacti usually with scarlet flowers ..... 23. *Heliocereus* (p. 127)
Areoles of the ovary laniferous or felted (also setiferous in some species of *Harrisia*).
Perianth-limb regular.
Perianth funnelform or salverform; tube mostly longer than limb.
Stout, upright cacti, columnar or with columnar branches.
Perianth-tube bearing areoles to top; perianth-segments broad ..... 24. *Trichocereus* (p. 130)
Perianth-tube slender, with few areoles or none; perianth-segments narrow ..... 25. *Jasminocereus* (p. 146)
Slender, arching, vine-like or bushy cacti.
Arching or vine-like cacti ..... 26. *Harrisia* (p. 147)
Low, bushy cacti ..... 27. *Borzicactus* (p. 159)
Perianth funnelform-campanulate, the tube stout.
Gigantic, columnar cacti; scales of flower broad ..... 28. *Carnegiea* (p. 164)
Stout, bushy cacti; scales of flower narrow ..... 29. *Binghamia* (p. 167)
Perianth-limb oblique; erect or bushy cacti with scarlet flowers .. 30. *Rathbunia* (p. 169)
BB. Perianth subcylindric, the limb short or none.
Scales when present on the ovary and flower-tube naked in their axils ..... 31. *Arrojadoa* (p. 170)
Scales on the ovary and flower-tube laniferous in their axils.
Flowers borne from a lateral pseudocephalium.
Flower-tube elongated; fruit dry ..... 32. *Oreocereus* (p. 171)
Flower-tube very short; fruit not dry ..... 33. *Facheiroa* (p. 173)
Flowers not borne from a lateral pseudocephalium.
Perianth-tube elongated, slender; stamens exserted ..... 34. *Cleistocactus* (p. 173)
Perianth-tube very short; stamens included ..... 35. *Zehntnerella* (p. 176)

KEY TO GENERA—continued.

AA. Flowers 2 to several at an areole; columnar cacti, or with columnar branches; flowers small.
Flowers without wool; areoles small.
Flowering areoles bearing many long bristles....36. *Lophocereus* (p. 177)
Flowering areoles without bristles....37. *Myrtillocactus* (p. 178)
Flowers densely woolly; flowering areoles enormously developed....38. *Neoraimondia* (p. 181)

1. **CEREUS** (Hermann) Miller,* Gard. Dict. Abridg. ed. 4. 1754.

Piptanthocereus Riccobono, Boll. R. Ort. Bot. Palermo 8: 225. 1909.

Stems mostly upright and tall, but sometimes low and spreading or even prostrate, generally much branched, the branches strongly angled or ribbed; areoles spiny, more or less short-woolly but never producing long silky hairs; flowers nocturnal, elongated, funnelform, the upper part, except the style, falling away from the ovary by abscission soon after anthesis; tube of flower cylindric, expanding above into the swollen throat, nearly naked without; outer perianth-segments obtuse, thick, green or dull colored, the inner thin, petaloid, so far as known white, except in one species and in that red; stamens numerous, varying greatly in length, slender and weak, included; style slender, elongated but often included; stigma-lobes linear; ovary bearing a few scales naked in their axils; fruit fleshy, red, rarely yellow, naked, splitting down one side when mature, often edible; seeds black.

Type species: *Cactus hexagonus* Linnaeus, this being the first species cited by Miller in his Gardeners' Dictionary, 8th edition, 1768, where he described 12 species of *Cereus* (in the 4th edition, abridged, 1754, he described 14 species), which we now know belong to several genera.

The genus *Cereus* has been understood by authors at one time or another since Philip Miller's time as containing species of nearly all the genera of cacti, including even *Rhipsalis* and *Opuntia*. Schumann, in his monograph, recognized 104 species, to which he afterward added 36 in his supplement. His treatment of the genus is artificial and complex; Berger's treatment (Rep. Mo. Bot. Gard. 16: 57 to 86. 1905) is much more natural but more inclusive, for he added *Echinopsis*, *Pilocereus*, *Cephalocereus*, and *Echinocereus*, and even suggested the possible transfer here of *Phyllocactus;* he divided the genus into 18 subgenera, most of which we believe require generic recognition (Contr. U. S. Nat. Herb. 12: 413 to 437. 1909), as also indicated by Riccobono (Boll. R. Ort. Bot. Palermo 8: 215 to 266. 1909). From some of Berger's conclusions we differ, but chiefly in cases where he knew the plants only from herbarium specimens or from literature. In his treatment of *Cereus* Berger referred the species which we include in it to his series *Piptanthocereus*, while he took up for the *Eucereus* a different series, but he indicated no type species. Our treatment includes all the species of Schumann's series *Compresso-costati*, *Formosi*, and *Coerulescentes*, and the two species, *C. tetragonus* and *C. hankeanus* of *Oligogoni*. It corresponds to Berger's subgenus *Piptanthocereus*, but is not so inclusive. We recognize 24 species, which have similar flowers, fruit, spines, and branches; these extend from the southern West Indies through eastern South America to Argentina. The fruits of several species are edible.

The number of published *Cereus* binomials involved is about 900, exceeded in this family only by *Mammillaria* and perhaps by *Opuntia*.

The name *Cereus* is from the Greek, also from the Latin, signifying a torch, with reference to the candelabrum-like branching of the first species known. It was used by Tabernaemontanus on page 386 of the second part of his Kreuterbuch, published in 1625, a plant called *Cereus peruvianus* being there illustrated; this figure represents a tall, columnar, branching species, perhaps the same as the one to which the name *peruvianus* has been applied by modern authors.

*Philip Miller credits the genus *Cereus* to P. Hermann (Par. Botavus 112. 1698) although the name *Cereus* had then been in use more than seventy years.

Key to Species.

A. Flowers large, 10 to 20 cm. long.
  B. Species tall, columnar (except *C. pachyrhizus*), the joints very thick.
    Ribs 4 to 6, very high, flat or nearly so (Series 1. *Hexagonae*).
      Young joints glaucous, blue or bluish green.
        Spines of young joints short or none.
          Ribs usually 4; young joints light blue ..... 1. *C. hexagonus*
          Ribs usually 6; young joints dark blue ..... 2. *C. hildmannianus*
        All joints manifestly spiny.
          Young spines bright yellow ..... 3. *C. alacriportanus*
          Young spines not yellow.
            Flowers red without ..... 4. *C. validus*
            Flowers green without ..... 5. *C. jamacaru*
      Young joints not glaucous, green, or sometimes glaucous in No. 7.
        Inner perianth-segments red ..... 6. *C. tetragonus*
        Inner perianth-segments white (unknown in *C. xanthocarpus*).
          Outer perianth-segments red.
            Spines 1 to 3, short or wanting or elongated in No. 7; seeds dull.
              Berry red or orange, unpleasant to the taste ..... 7. *C. stenogonus*
              Berry yellow, edible ..... 8. *C. xanthocarpus*
            Spines 8 to 13, up to 4 cm. long; seeds shining.
              Tree-like, 6 to 8 meters high, not densely spiny ..... 9. *C. lamprospermus*
              Lower, 1 to 3 meters high, densely spiny ..... 10. *C. pachyrhizus*
          Outer perianth-segments green or brownish.
            Spines few, short or wanting ..... 11. *C. dayamii*
            Spines 6 to 10, up to 10 cm. long ..... 12. *C. argentinensis*
    Ribs 6 to 9, rarely 4, thicker and lower; outer perianth-segments brownish (Series 2. *Peruvianae*) ..... 13. *C. peruvianus*
  BB. Species lower, prostrate, or bushy, the joints mostly not as stout (*C. chalybaeus* tall).
    Joints green (Series 3. *Obtusae*).
      Ribs only 4 to 6 mm. high; plants shining ..... 14. *C. perlucens*
      Ribs much higher; plants dull.
        Spines subulate ..... 15. *C. variabilis*
          Flower 20 to 24 cm. long.
          Flower 12 to 16 cm. long ..... 16. *C. pernambucensis*
        Spines acicular.
          Radial spines 5 to 7; central spine 1 ..... 17. *C. obtusus*
          Radial spines 8 to 10; central spines 4 to 7 ..... 18. *C. caesius*
    Joints glaucous blue; species slender (Series 4. *Azureae*).
      Ribs strongly sinuate ..... 19. *C. azureus*
      Ribs not strongly sinuate.
        Tree-like; areoles distant ..... 20. *C. chalybaeus*
        Bush-like; areoles close together ..... 21. *C. aethiops*
AA. Flowers small, 8 cm. long or less; plants columnar (Series 5. *Repandae*).
    Flowers 7 to 8 cm. long; spines straight, acicular.
      Spines up to 5 cm. long, acicular; flowers green; branches constricted ..... 22. *C. repandus*
      Spines 2 cm. long or less; flowers purple; branches continuous ..... 23. *C. grenadensis*
    Flowers 5 to 6 cm. long; spines curved, subulate ..... 24. *C. margaritensis*

1. **Cereus hexagonus** (Linnaeus) Miller, Gard. Dict. ed. 8. No. 1. 1768.

Cactus hexagonus Linnaeus, Sp. Pl. 466. 1753.
Cactus octogonus Page in Steudel, Nom. ed. 2. 1: 246. 1840.
*Cereus northumberlandianus** Lambert in Loudon, Gard. Mag. **17:** 91. 1841 (February).
Cereus perrottetianus Lemaire, Icon. Cact. pl. 8. 1841 to 1847.
Cereus lepidotus Salm-Dyck, Cact. Hort. Dyck. 1849. 207. 1850.

Plant up to 15 meters high, usually branching near the base, with a trunk 4 dm. in diameter; branches usually strict and erect, but in old plants more spreading, made up of short joints 12 cm. in diameter or more, glaucescent or light green, usually 6-angled but sometimes only 4 or 5-angled, occasionally 7; ribs thin, 3 to 5 cm. high, the margins undulate; areoles about 2 cm. apart, small, felted; spines on young branches wanting or few, very short (2 to 3 mm. long), but on old branches often 8 to 10 or perhaps more in a cluster, very unequal, the longest ones 5 to 6 cm. long, when young brown, but lighter in age; flower 20 to 25 cm. long, its tube slender, 10 cm. long; uppermost scales green, short; outer perianth-segments lanceolate to oblong-lanceolate, 6 to 7 cm. long, short-apiculate, tinged with purple; inner perianth-segments much thinner than the outer ones, white,

*The name was published in Loudon's Gardener's Magazine first as *Cereus northumberlandia* with a suggestion by the editor that *Cereus northumberlandianus* was the preferred spelling but later in the same year (Hort. Univ. 2: 318. 1841) *Cereus northumberlandianus* was adopted. A re-examination of the description of Linnaeus's *Cactus hexagonus*, which came from Surinam, leads us to believe that it is the same species and as the name is older than either *C. northumberlandianus* or *C. lepidotus* we here use it.

oblong-lanceolate, 7 to 8 cm. long; stamens very numerous; style green; fruit ovoid, 5.5 to 13 cm. long, somewhat oblique, truncate or a little depressed at apex, pale red, a little glaucous, bearing small scattered areoles; rind thick; pulp white or pinkish, edible; seeds black.

Type locality: Surinam.

Distribution: Southern West Indies and northern South America. Often cultivated in the West Indies and South America. Reported from Brazil, but doubtless in error. Also cultivated in the Philippines.

This cactus is a great favorite in the West Indies, where it is much cultivated in yards and parks, and blooms abundantly, the flowers appearing all along the side of the stem. It is sometimes confused with *Cereus jamacaru*, and has long passed under the name of *Cereus lepidotus*. The plant was introduced into England from Tobago Island about 1840 by M. Nightingale, and was then supposed to be the largest cactus ever brought into Europe. Recently Mr. W. E. Broadway has sent us both living and herbarium specimens from Tobago which are identical with the so-called *Cereus lepidotus*. The original specimens of *Cereus lepidotus* came from La Guayra, Venezuela, a floral region similar to Tobago, while the *Cactus hexagonus* type locality was Surinam.

FIG. 1.—Cereus hexagonus.

Cereus hexagonus.—FIG. 2, Flower; FIG. 3, Longitudinal section of flower; FIG. 4, Fruit. All ×0.4.

It was introduced into England, according to Salm-Dyck, as *Cereus karstenii*.

In our earlier treatment of this species we combined it with *C. peruvianus* which we now believe was an error. *Cereus hexagonus* is confined to northern South America and the West Indies while *C. peruvianus* is restricted to southeastern South America.

We have seen no Colombian specimens of this species unless we should refer here flowers collected by Dr. Francis W. Pennell from the Sabana of Bolivar (No. 4782).

Cereus horridus Otto (Pfeiffer, Allg. Gartenz. 5: 370. 1837) and *C. thalassinus* Otto and Dietrich (Allg. Gartenz. 6: 34. 1838), referred to *C. jamacaru* by Schumann, probably belong here. Both are from La Guayra, Venezuela. *Cereus thalassinus quadrangularis* (Förster, Handb. Cact. 399. 1846) was used as a synonym of *C. thalassinus*.

Illustrations: Contr. U. S. Nat. Herb. 12: pl. 61, as *Cereus jamacaru;* Lemaire, Ic. Cact. pl. 8*, as *Cereus perrottetianus;* Maza and Roig, Fl. Cuba pl. 23, as *Cereus lepidotus.*

Text-figure 1 is from a photograph of the plant taken by Marshall A. Howe at Santurce, Porto Rico; text-figure 2 shows a flower and text-figure 3 a longitudinal section of the same drawn by Miss H. A. Wood at Hope Gardens, Jamaica; text-figure 4 shows a fruit collected by Dr. Rose near Carácas, Venezuela, in 1916.

2. **Cereus hildmannianus** Schumann in Martius, Fl. Bras. 4^2: 202. 1890.

Plant tall, up to 5 meters high, often much branched; ribs 5 or 6, high, thin, rounded, green or often with large yellow patches along the sides; areoles distant, large, at first without spines, afterward a few developing; flower elongated, funnelform, 20 to 23 cm. long; inner perianth-segments white, broad and obtuse; ovary naked, 2.5 to 3 cm. long.

Type locality: State of Rio de Janeiro, Brazil.
Distribution: Eastern Brazil.

FIG. 5.—Cereus hildmannianus.

FIG. 6.—Cereus hildmannianus.

Although this species seems to be a common yard and park plant in Bahia and Rio de Janeiro, it has never been well understood. It there forms bushy plants and is usually without spines. It is probably quite distinct from *Cereus jamacaru,* to which it has been referred by some authors; it grows in moister regions.

Illustrations: Martius, Fl. Bras. 4^2: pl. 41, f. 1; Monatsschr. Kakteenk. 2: 57.

Text-figure 5 is from a photograph taken by Paul G. Russell near Rio de Janeiro, Brazil, in 1915; text-figure 6 is from a photograph taken by Dr. J. N. Mills at Rio de Janeiro in 1916.

3. **Cereus alacriportanus** Pfeiffer, Enum. Cact. 87. 1837.

Cereus peruvianus alacriportanus Schumann, Gesamtb. Kakteen 115. 1897.
Cereus paraguayensis Schumann in Chodat and Hassler, Bull. Herb. Boiss. II. 3: 249. 1903.

Stems up to 2 meters high; ribs mostly 5, strongly compressed, 3 cm. high, separated by deep sharp intervals, rounded on the edge; areoles 2 to 2.5 cm. apart, when young filled with white wool; spines 6 to 9, all spreading, when young golden yellow, but gray when older, red at the bases, subulate, 2.5 cm. long; flowers 21 to 22 cm. long, 10 cm. broad at mouth; outer perianth-segments narrow, 1 cm. wide or less; inner perianth-segments spatulate, obtuse to acute, fringed or entire, white with a rosy tinge; stigma-lobes 13, yellowish green; ovary cylindric, naked.

Type locality: Porto Alegre, Brazil.
Distribution: Southern Brazil and Paraguay.

*Lemaire's plates are not numbered and there is more or less uncertainty as to their order. We have followed Schumann in referring this species to plate 8. In the only copy which we have examined it is plate 11.

M. E. Eaton del

1. Top of flowering stem of *Cereus alacriportanus*.
2. Top of stem of *Cereus peruvianus*.
3. Flower of the same plant.

(Natural size.)

This species has long been in cultivation in the New York Botanical Garden under the name of *Cereus alacriportanus*, where it has frequently flowered. It differs somewhat from the description of *C. paraguayensis* by Schumann in the color of the spines and closeness of the areoles.

Cereus bonariensis is referred here by Förster (Handb. Cact. 388. 1846) as a synonym. Sweet also used the name (Hort. Brit. ed. 3. 283. 1839) but does not associate it with this species.

Illustrations: Chodat, Veg. Paraguay 1: f. 90, as *C. paraguayensis;* Karsten, Deutsche Fl. f. 501, No. 7.

Plate II, figure 1, shows the plant in the New York Botanical Garden above referred to, which flowered in April 1915.

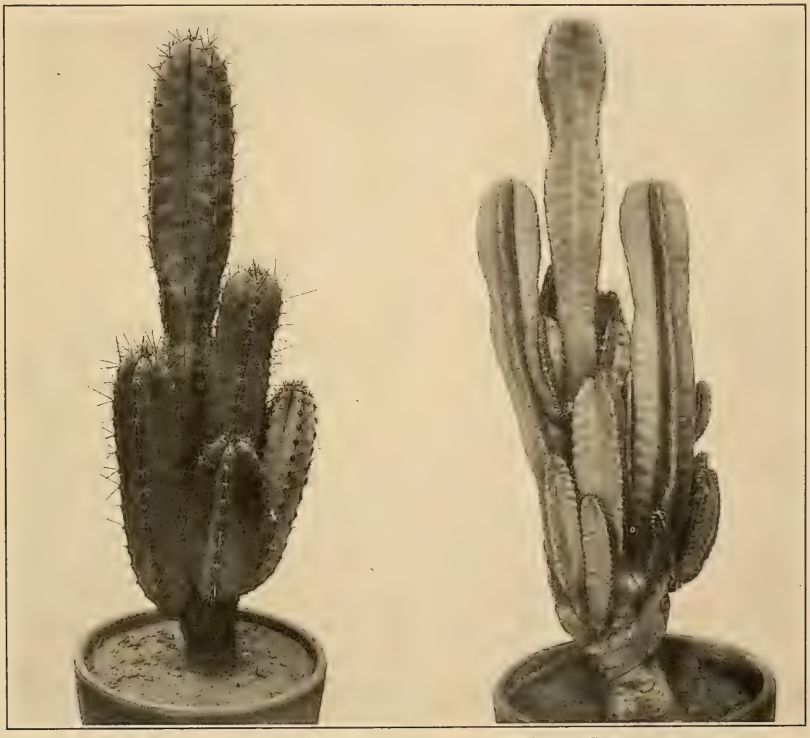

FIG. 7.—Cereus validus.

FIG. 8.—Cereus tetragonus.

4. **Cereus validus** Haworth, Phil. Mag. **10:** 420. 1831.

Cereus forbesii Otto in Förster, Handb. Cact. 398. 1846.*
Cereus hankeanus Weber in Schumann, Gesamtb. Kakteen 88. 1897.
Piptanthocereus forbesii Riccobono, Boll. R. Ort. Bot. Palermo **8:** 228. 1909.
Piptanthocereus hankeanus Riccobono, Boll. R. Ort. Bot. Palermo **8:** 229. 1909.
Piptanthocereus labouretianus Riccobono, Boll. R. Ort. Bot. Palermo **8:** 231. 1909.
Piptanthocereus validus Riccobono, Boll. R. Ort. Bot. Palermo **8:** 234. 1909.

Shrubby, 2 meters high or more, somewhat branched, the branches 5 to 8 cm. thick, glaucous when young; ribs 4 to 8, compressed, obtuse; radial spines 5, short, stout, 1 to 2 cm. long, mostly

*The date of publication of this name is usually given as 1845; this reference, however, is only to the use of the name, without a description, in a publication of that date.

from the lower part of the areole; central spine single or rarely 2 or 3, stouter than the radials, sometimes 16 cm. long; flowers funnelform; outer perianth-segments reddish, obtuse, the inner white or reddish; style green below; stigma-lobes about 16.

Type locality: Not cited.

Distribution: Provinces of Córdoba, Catamarca, and Tucuman, Argentina.

Cereus labouretianus Martius and *C. haematuricus* Weber, mentioned by Schumann, are only catalogue names and should not go into the published synonymy of this species.

Illustration: Blühende Kakteen **2**: pl. 114, as *C. hankeanus*.

Plate III, figure 1, shows the top of a plant in the New York Botanical Garden, received from Kew in 1911; figure 2 shows a joint and a flower of a plant received from La Mortola as *Cereus hankeanus*. Text-figure 7 is from a photograph of a plant in the same collection, received from the Missouri Botanical Garden in 1904.

5. **Cereus jamacaru** De Candolle, Prodr. **3**: 467. 1828.

Cereus glaucus Salm-Dyck, Hort. Dyck. 335. 1834.
Cereus laetevirens Salm-Dyck, Hort. Dyck. 336. 1834.
Cereus lividus Pfeiffer, Allg. Gartenz. **3**: 380. 1835.
Cactus jamacaru Kosteletzky, Allg. Med. Pharm. Fl. **4**: 1393. 1835.
Cereus horribarbis Otto in Salm-Dyck, Cact. Hort. Dyck. 1849. 205. 1850.
Cereus cauchinii Rebut in Schumann, Gesamtb. Kakteen 113. 1897.
Piptanthocereus jamacaru Riccobono, Boll. R. Ort. Bot. Palermo **8**: 229. 1909.
Piptanthocereus jamacaru cyaneus Riccobono, Boll. R. Ort. Bot. Palermo **8**: 230. 1909.
Piptanthocereus jamacaru glaucus Riccobono, Boll. R. Ort. Bot. Palermo **8**: 231. 1909.

Plant up to 10 meters high, with a short, thick, woody trunk, very much branched, the branches usually erect, numerous, often forming a compact top, when young often quite blue, with few (4 to 6) ribs; ribs of young branches thin, high, more or less undulate; areoles large, 2 to 3 cm. apart; spines various, on old stems and branches numerous, at first yellow, often very long, 20 to 30 cm. long; flowers nocturnal, large, 30 cm. long, white; ovary purplish, bearing a few minute brown scales; stigma-lobes numerous, 2 cm. long; fruit large, sometimes 12 cm. long by 8 cm. in diameter, bright red, splitting down on one side showing the white edible pulp; seeds 3 mm. long, dull, roughened with blunt tubercles.

FIG. 9.—Cereus jamacaru.

Type locality: Brazil.

Distribution: Brazil. Planted in the West Indies; perhaps naturalized on some islands.

Cereus jamacaru is one of the commonest cacti in Bahia and is found in all kinds of situations from the coast to the inland desert. It is always large, 10 meters tall or more, usually much branched. When living in dense forests it has a simple stem or only a few branches, growing tall and erect, the branches have few ribs, but these are high and at first very blue, covered with formidable spines said to be 30 cm. long at times, although we have seen none

which measured more than 19 cm. in length. The flowers are large and white, opening at night; the perianth cuts off early from the ovary, leaving the style, which is persistent. The woody trunk may be 6 dm. in diameter, and boards suitable for boxes, picture frames, etc., are sawed from it. In most of the smaller houses in the country the cross pieces upon which the tile roofing is laid are from this cactus, which is called mandacaru and mandacaru de boi. The specific name *jamacaru*, said by some writers to be the vulgar name of the plant in Brazil, is doubtless a corruption of mandacaru. It is sometimes planted about country houses, often as a kind of hedge. In times of great drought the farmers cut off the young branches from these cacti to feed to their cattle.

Cereus horridus Otto (Pfeiffer, Allg. Gartenz. 5: 370. 1837) and *C. thalassinus* Otto and Dietrich (Allg. Gartenz. 6: 34. 1838), referred to *C. jamacaru* by Schumann, belong elsewhere; both are from La Guayra, Venezuela.

Cereus lividus was based upon a Brazilian species. Two years after it was described, Pfeiffer redescribed it, referring to it as a synonym *C. perotetti* (Pfeiffer, Enum. Cact. 98), and giving the distribution as Brazil and La Guayra, Venezuela. The plant from La Guayra is doubtless *C. hexagonus*.

Cereus lividus glaucior (Labouret, Monogr. Cact. 359. 1853), given as a synonym of *C. lividus*, may belong here.

Cereus jamacaru glaucus (Ladenberg, Monatsschr. Kakteenk. 3: 70. 1893) is only a name.

Illustrations: Karsten, Deutsche Fl. f. 501, No. 8; Pison, Hist. Nat. Bras. 100. f. 1; Schumann, Gesamtb. Kakteen f. 25; Curtis's Bot. Mag. 95: pl. 5775, this last as *Cereus lividus*.

Figure 9 is from a photograph taken by Mr. P. H. Dorsett near Joazeiro, Bahia, Brazil, in 1914.

6. Cereus tetragonus (Linnaeus) Miller, Gard. Dict. ed 8. No. 2 1768.

Cactus tetragonus Linnaeus, Sp. Pl. 466. 1753.

Plant upright, 1 to 2 meters high, freely branching; branches green, erect, forming a narrow compact top; ribs mostly 4, rarely 5, at first high, separated by acute intervals, compressed, obtuse; areoles close together, white-felted; spines brown to nearly black, usually acicular to subulate; radial spines 5 or 6, 6 to 8 mm. long; central spines solitary or several, a little stouter than the radials; flower funnelform, 13 cm. long; all the perianth-segments reddish; ovary bearing small scales, glabrous.

Type locality: Curaçao, according to Linnaeus, but not known there now.

Distribution: Rio de Janeiro, Brazil, according to Schumann.

Our description is drawn partly from living specimens in the New York Botanical Garden.

Cereus tetragonus ramosior Link and Otto (Verh. Ver. Beförd. Gartenb. 6: 432. 1830) is given by name only; *C. tetragonus major* Salm-Dyck (Walpers, Repert. Bot. 2: 277. 1843) is given as a synonym for *C. tetragonus*.

Illustration: Monatsschr. Kakteenk. 12: 158.

Figure 8 is from a photograph of a plant in the New York Botanical Garden, received from Mr. Frank Weinberg in 1901.

7. Cereus stenogonus Schumann, Monatsschr. Kakteenk. 9: 165. 1899.

Tree-like, up to 6 to 8 meters high, much branched or nearly simple, bluish green to yellowish green; ribs 4 or 5, very narrow, high; spines 2 or 3, short, conic, the longest 6 to 7 mm. long or subulate and the longer up to 4.5 cm. long; flowers large, 20 to 22 cm. long, funnelform, the tube long and slender; outer perianth-segments narrow, 7 to 8 cm. long, mucronate, rose-colored or with rose-colored margins; fruit large, 10 cm. long or less, red or orange without, with white or carmine flesh; seeds dull.

Type locality: Paso la Cruz, Paraguay.

Distribution: Paraguay and northeastern Argentina.

We know the species only from description, from a flower collected by Dr. E. Hassler from the region of the type locality, and from living plants and specimens collected by Dr. Shafer at Posadas, Argentina. It is now grown in the Hanbury Garden at La Mortola, Italy.

Figure 10 is from a photograph taken by Dr. Shafer at Posadas, Argentina, in 1917.

8. Cereus xanthocarpus Schumann, Gesamtb. Kakteen Nachtr. 32. 1903.

Tall, tree-like, up to 6 meters high, somewhat branched, very spiny at apex; ribs of branches 4 to 6, high, very narrow; areoles 3 to 4 cm. apart, white-woolly; spines 3 or 4, short, conic, dark brown; flowers opening at night; flower-tube 12.5 cm. long, yellowish green below, whitish green above; outer perianth-segments oblong to lanceolate, 4 to 12 cm. long, whitish green; inner perianth-segments white; fruit yellow, oblong, 6.5 to 7 cm. long, the flesh white; seeds 2 mm. long, kidney-shaped.

Type locality: Calle Manora, Paraguay.
Distribution: Paraguay.

We have not seen this species; in its yellow fruit it differs from most other known members of this genus.

All we know about *Cereus coracare* Gosselin is that Hirscht (Monatsschr. Kakteenk. **9**: 159. 1899) states that Mr. Roland-Gosselin is to be thanked for a splendid fruit of *Cereus coracare*, which in form and size resembles an apple, is of a beautiful color and of excellent taste to eat, and a note of Graebener (Monatsschr. Kakteenk. **12**: 174. 1902) that *Cereus coracare* was from Paraguay and was then 19 cm. high. It may belong here.

The status of this and the following two species, all from Paraguay, can be determined only by further observations in that region.

FIG. 10.—Cereus stenogonus.

9. Cereus lamprospermus Schumann, Monatsschr. Kakteenk. **9**: 166. 1899.

Tree-like, 6 to 8 meters high, very much branched; branches green, soon erect; ribs 6 to 8, thickish and obtuse, separated by rounded intervals; spines 8 to 11, hardly distinguished as radials and centrals; areoles 2 to 2.5 cm. apart, subulate; flower 15 to 16 cm. long; outer perianth-segments green with reddish tips; stigma-lobes 13; ovary nearly naked; seeds black, shining.

Type locality: Fuerte Olympo, Paraguay.
Distribution: Paraguay.

10. Cereus pachyrhizus Schumann, Gesamtb. Kakteen Nachtr. 33. 1903.

Plant upright, 1, or at the most, 3 meters high, with swollen tuberous roots; branches or stem up to 10 cm. thick, rounded at the apex, terminated by large and numerous spines; older joints yellowish brown, younger ones yellowish green, subglaucous; ribs 6, very strongly compressed laterally, up to 1 cm. thick and 5 cm. high, separated by sharp, deep furrows, subsinuate; areoles 2.5 to 3 cm. apart, circular, 5 to 6 mm. in diameter, with short felt, which is not curly even when young; spines 10 to 13, poorly differentiated into radial and central ones, one of the latter being longest and up to 3 cm. long; all spines subulate and very sharp; fruit ellipsoid, 5 cm. long, 3 to 4 cm. in diameter, naked, smooth; seeds 2.5 mm. long, subcompressed, shining.

Type locality: Cerro Noaga, Paraguay.
Distribution: Paraguay.

This species is unknown to us, except from the original description. It is recorded as growing on bare, granitic rocks at 350 meters altitude.

11. Cereus dayamii Spegazzini, Anal. Mus. Nac. Buenos Aires III. 4: 480. 1905.

Tree-like, 10 to 25 meters high, with a cylindric trunk; branches 5-ribbed or 6-ribbed; ribs 3 cm. high, pale green; areoles orbicular, large, 5 to 6 mm. in diameter; spines few or wanting, when present 4 to 12 mm. long, brown with a yellowish base; flowers funnelform, large, glabrous, up to 25 cm. long; inner perianth-segments white; fruit oblong, glabrous, red without, 6 to 8 cm. long; pulp white, edible; seeds black.

Type locality: Near Colony of Resistencia, Chaco, Argentina.

Distribution: Southern Chaco, Argentina.

Figure 11 is from a photograph given to Dr. Rose by Dr. Spegazzini.

12. Cereus argentinensis nom. nov.

Cereus platygonus Spegazzini, Anal. Mus. Nac. Buenos Aires III. 4: 481. 1905. Not Otto. 1850.

Erect, 8 to 12 meters high, with a definite trunk; branches numerous, stout, curved at base but soon erect, 10 to 15 cm. in diameter; ribs 4 or 5, 4 to 5 cm. high, thin in section, separated by wide intervals; radial spines 5 to 8, brownish, 3 to 5 cm. long; central spines 1 or 2, 10 cm. long; flowers funnelform, large, 17 to 22 cm. long, inodorous; outer perianth-segments green or reddish at tips; inner perianth-segments white; fruit glabrous, smooth.

Fig. 11.—Cereus dayamii.

Type locality: Central Chaco, Argentina.

Distribution: Territory of the Chaco, Argentina.

This species must be close to *C. stenogonus*, as suggested by Berger, although Spegazzini says it is distinct; it must also be closely related to *C. dayamii*.

Figure 12 is from a photograph of a plant of *C. platygonus* Spegazzini, in Dr. Spegazzini's garden at La Plata, Argentina.

13. Cereus peruvianus (Linnaeus) Miller, Gard. Dict. ed. 8. No. 4. 1768.

Cactus peruvianus Linnaeus, Sp. Pl. 467. 1753.
?*Cereus calvescens* De Candolle, Mém. Mus. Hist. Nat. Paris **17**: 116. 1828.
?*Cereus spinosissimus* Förster, Hamb. Gartenz. **17**: 165. 1861.

Usually tall, said to reach 16 meters in height, tree-like, with a large much branched top; branches 10 to 20 cm. in diameter, usually green, sometimes glaucous, with 6 to 9 ribs, sometimes as few as 4; spines acicular, 5 to 10, brown to black, 1 to 3 cm. long; flower rather large, about 15 cm. long, with a thick tube; upper scales and outer perianth-segments obtuse, red or brownish; inner perianth-segments oblong, white; fruit subglobose, orange-yellow, somewhat glaucous, about 4 cm. in diameter; seeds black, 2 mm. broad, rough.

Type locality: Uncertain. Linnaeus says it is from Jamaica and the arid coast of Peru. No native *Cereus* is known either from Jamaica or Peru. It was called *Cereus peruvianus* by Bauhin in 1623 but no station was given. Our description applies to the plant from the southeastern coast of South America for which the name *Cereus peruvianus* has been used by most recent authors.

Distribution: Southeastern South America; widely planted in tropical America.

Cereus peruvianus tortuosus (Salm-Dyck, Cact. Hort. Dyck. 1844. 30. 1845) and *C. peruvianus tortus* (Salm-Dyck, Cact. Hort. Dyck. 1849. 46. 1850) are names only.

Cereus peruvianus monstrosus is a common garden form first described as a variety by De Candolle (Prodr. 3: 464. 1828). It is similar to the typical form except that the ribs are often broken into irregular tubercles or are unevenly sulcate. This has also been

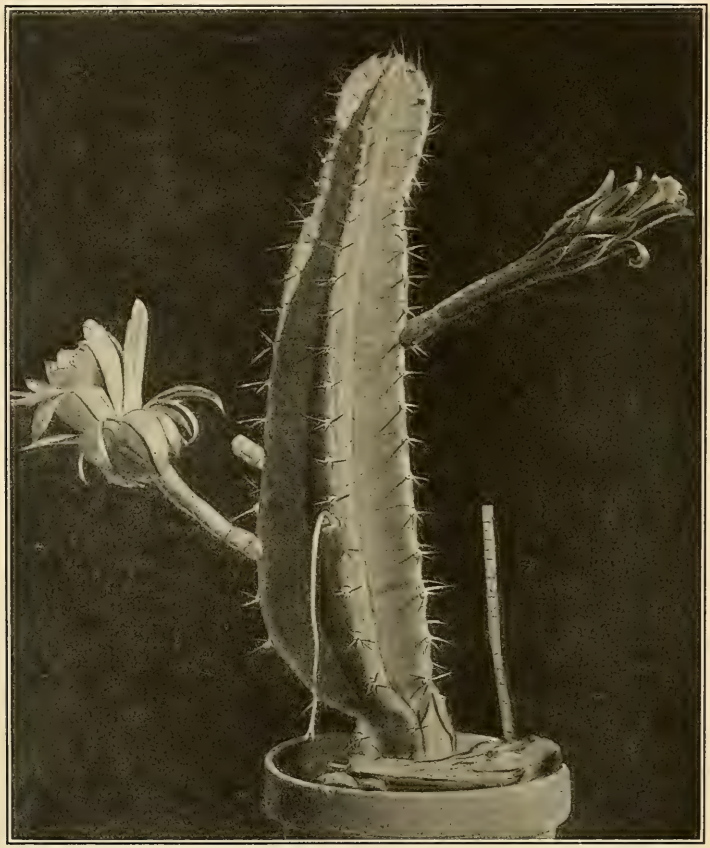

FIG. 12.—A cultivated specimen of Cereus argentinensis.

taken up as *Cereus monstrosus* (Steudel, Nom. ed. 2. 1: 334. 1840), as *Cereus monstrosus minor* (Monatsschr. Kakteenk. 1: 163. 1891) and as *C. monstruosus* Schumann (Engler and Prantl, Pflanzenfam. 3^{6a}: 178. 1894). It seems to be the same as *Cactus abnormis* Willdenow (Enum. Pl. Suppl. 31. 1813).* *Cereus peruvianus monstruosus nanus* is a somewhat similar form mentioned by Schumann (Gesamtb. Kakteen 115. 1897) perhaps intended

*Taken up later as *Cereus abnormis* by Sweet (Hort. Brit. 171. 1826). Another abnormal form is *C. peruvianus cristatus* (Graebener, Monatsschr. Kakteenk. 11: 29. 1901).

for *C. peruvianus monstrosus minor* (Salm-Dyck, Cact. Hort. Dyck. 1849. 46. 1850). *C. peruvianus brasiliensis* (Förster, Handb. Cact. 390. 1846) probably does not apply to this species.

Cereus surinamensis Trew (Ephem. Nat. Cur. 3: 394. pl. 7, 8, 1733) is referred here by Förster, but to *C. monoclonos* by Pfeiffer. The illustrations, though poor, indicate that it is a *Cereus* and not a *Cephalocereus*. From the name we should expect it to be referable to *Cereus hexagonus*.

Förster (Handb. Cact. 389. 1846) states that Pfeiffer has called this plant *Cereus decandollii*, but Förster doubts the correctness of this.

This species has long been known under the name of *Cereus peruvianus*, and is probably the most widely cultivated *Cereus*. In conservatories it is rarely found more than 2 meters in height.

Illustrations: Anal. Mus. Nac. Montevideo 5: pl. 1, 28 to 31; Blühende Kakteen 3: pl. 131; Cact. Journ. 2: March; Hist. Acad. Paris 1741: pl. 4, 5; Monatsschr. Kakteenk. 10: 7; Pfeiffer, Abbild. Beschr. Cact. 2: pl. 5; Rep. Mo. Bot. Gard. 5: pl. opp. 12; Stand. Cycl. Hort. Bailey 2: f. 884, all as *Cereus peruvianus;* Cact. Journ. 1: 79; October; Gard. Chron. 1873: f. 31; III. 24: f. 46; Home Farm. Gard. III. 60: 145; Mém. Mus. Hist. Nat. Paris 17: pl. 11, all as *Cereus peruvianus monstrosus;* Gerarde, Herball ed. 1. 1015; ed. 2 and 3, 1179, all as *Cereus peruvianus spinosus;* Bradley, Hist. Succ. Pl. ed. 2. pl. 1, as *Cereus erectus maximus* etc.; DeTussac, Fl. Antill. 2: pl. 33; Loudon, Encycl. Pl. 410. f. 6855, as *Cactus peruvianus*.

Fig. 13.—C. peruvianus. ×0.8.

Plate 11, figure 2, represents the top of a plant in the collection of the New York Botanical Garden; figure 3 shows the flower of the same plant. Figure 13 shows a fruit of a plant in the same collection.

14. **Cereus perlucens** Schumann, Monatsschr. Kakteenk. 10: 173. 1900.

Columnar, erect, not very high; ribs 6 or 7, thin but obtuse, 4 to 6 mm. high, bright green or more or less bluish green or even violet when young, somewhat pruinose; areoles about 1 cm. apart, circular, bearing curly woolly hairs; radial spines 8 to 10, chestnut-brown, spreading, acicular, 1 cm. long; central spine solitary, stouter than the radials.

Type locality: Along the Amazon, Manaos, Brazil.

Distribution: Brazil.

We know this species only from a cutting received from the Berlin Botanical Garden; Dr. Schumann referred it to his series *Formosi*, between his *C. pitajaya* (*C. obtusus*) and *C. caesius;* he did not know the flower, however, and was not certain but that it might not belong to his genus *Pilocereus;* the cutting appears to us to represent a *Cereus*.

15. **Cereus variabilis** Pfeiffer, Enum. Cact. 105. 1837.

Creeping over rocks or clambering into trees, up to 4 meters high; stem made up of short thick joints, 18 to 30 cm. long by 6 to 9 cm. in diameter; ribs 3 to 5, stout, when old strongly crenate, obtuse, with strong indentations on the sides extending from the areoles with a broad upward bend to the bottoms of the ribs; spines about 8, yellowish, the longest about 5.5 cm. long; flower 20 to 27 cm. long, with a very slender, green, and somewhat angled tube; scales of the ovary and lower part of the flower-tube ovate, acute; outer perianth-segments green or yellowish green, linear, acute; inner perianth-segments white.

Type locality: Not definitely cited.

Distribution: Coast of central Brazil.

The plant collected by Dr. Rose on Ilha Grande, near Rio de Janeiro, flowered in the New York Botanical Garden, August 9, 1916, the flower being unusually large. We feel convinced that this is the plant illustrated as below cited. Here, too, is perhaps to be

referred plate 4084 of Curtis's Botanical Magazine with the name *Cereus pitajaya*, although its flowers are smaller and the inner perianth-segments are more serrate.

While this species is somewhat similar to the common low *Cereus pernambucensis* of the Brazilian coast, it is stouter, often reaching a height of 4 meters, and has much larger flowers.

Cereus glaucus speciosus (Pfeiffer, Enum. Cact. 106. 1837) is referred to *Cereus variabilis* by both Pfeiffer and Rümpler. *C. brandii* (Salm-Dyck, Cact. Hort. Dyck. 1849. 49. 1850) and *C. colvillii* (Rümpler in Förster, Handb. Cact. ed. 2. 736. 1885) of English gardens are also referred here.

C. variabilis glaucescens Salm-Dyck, var. *laetevirens* Salm-Dyck, var. *micracanthus* Salm-Dyck, var. *salm-dyckianus*, and var. *obtusus* are all given by Walpers (Repert. Bot. 2: 277. 1843) as synonyms of this species. The last name probably should be referred to *Cereus obtusus*. The varieties *gracilior* and *ramosior* (Salm-Dyck, Cact. Hort. Dyck. 1849. 49. 1850) are only names. Of this relationship is *Cereus grandis* Haworth (Suppl. Pl. Succ. 76. 1819) and its two varieties *gracilior* Salm-Dyck and *ramosior* Salm-Dyck (Labouret, Monogr. Cact. 376. 1853).

Cereus prismatiformis, *C. hexangularis*, and *C. affinis* (Pfeiffer, Enum. Cact. 106. 1837) were all given as synonyms of *Cereus variabilis*.

Illustrations: Pfeiffer, Abbild. Beschr. Cact. 2: pl. 15, as *Cereus variabilis;* Vellozo, Fl. Flum. 5: pl. 23, as *Cactus tetragonus*.

FIG. 14.—Cereus pernambucensis.

16. Cereus pernambucensis* Lemaire, Cact. Gen. Nov. Sp. 58. 1839.

?*Cereus tetragonus minor* Salm-Dyck, Hort. Dyck. 337. 1834.
Cereus formosus Förster, Handb. Cact. 404. 1846.

Plant various in habit, often growing in clumps and then sometimes 4 to 5 meters broad, creeping and sprawling, usually 2 to 4 dm. high, perhaps much higher; branches usually short, with 3, 4, or 5 ribs, pale green, sometimes nearly white; ribs prominent, often strongly crenate and very thick; areoles large, 1.5 to 2 cm. apart, at first brown-woolly, afterwards with short white wool; intervals between ribs of young shoots acute, deep, but on old shoots broad and shallow; spines 4

*Originally, but erroneously, spelled *Cereus fernambucensis*.

to 10, acicular, yellowish brown to bright yellow, the longest ones 5 cm. long; flower-buds purplish, erect, 16 cm. long, pointed; scales on ovary and lower part of flower-tube minute, deep red, naked in their axils; flowers white; fruit narrowly oblong, 6 to 7 cm. long, purplish red, when mature splitting on one side exposing the white edible pulp and black seeds; style persisting after the perianth falls; seeds shining, 2 mm. long.

Type locality: Not cited.

Distribution: Coast of Brazil and Uruguay.

This species of the coast of Brazil is what Schumann described as *Cereus pitajaya*, but an examination of the original description of *Cactus pitajaya* Jacquin shows that this plant came from the coast of Colombia and is evidently an *Acanthocereus*.

Cereus pernambucensis is common along the seacoast of Brazil. Dr. Rose observed it at Bahia, Rio de Janeiro, Cabo Frio, and at Santos, but it is reported from both north and south of those regions. It is very common in the sand just back of the ocean beach, and on rocks near the sea, where it is usually low, often prostrate, growing in clumps. At times it grows much taller, unless we have associated another species with it. The taller plants suggest a small form of *C. jamacaru*, which is normally an interior desert species, while *C. pernambucensis* is to be found only on the coast; besides the differences in size of flowers and fruits, *C. pernambucensis* has shining seeds, which in the other species are dull.

Illustration: Vellozo, Fl. Flum. **5**: pl. 22, as *Cactus pentagonus*.

Figure 14 is from a photograph taken by Paul G. Russell at Bahia, Brazil, in 1915.

17. Cereus obtusus Haworth, Rev. Pl. Succ. 70. 1821.

Low, branching at base, dull green slightly glaucous; branches at first strongly ribbed, but in age simply angled; ribs on young growth separated by deep intervals, obtuse, 2 to 2.5 cm. high, with long grooves running down from the areoles; areoles 1 to 2 cm. apart; spines acicular, yellowish; radial spines usually 5 to 7; central spine 1; flower and fruit unknown.

Type locality: Not cited.

Distribution: South America, presumably Brazil.

The above description is drawn from a plant sent from the Edinburgh Botanical Garden to New York in 1902.

Figure 15 is from a photograph of the specimen above mentioned.

18. Cereus caesius Salm-Dyck in Pfeiffer, Enum. Cact. 89. 1837.

Cereus jamacaru caesius Salm-Dyck in Fobe, Monatsschr. Kakteenk. **18**: 90. 1908.
Piptanthocereus jamacaru caesius Riccobono, Boll. R. Ort. Bot. Palermo **8**: 230. 1909.

Branching at base; branches strongly angled; ribs 5 to 7, high, somewhat acute, repand; areoles 1.5 to 2.5 cm. apart; spines acicular, brown, the radials 8 to 10; central spines 4 to 7, similar to the radials, 12 mm. long or less; flowers and fruit unknown.

Type locality: Not cited.

Distribution: Probably Brazil.

This species was described from greenhouse plants of unknown origin; later these were supposed to have come from South America, probably from Brazil. We have studied a cutting received from the Berlin Botanical Garden.

Cereus glaucus (Pfeiffer, Enum. Cact. 89. 1837) was published as a synonym of *C. caesius*. *Cereus laetevirens caesius* (Förster, Handb. Cact. 400. 1846), published as a synonym only, doubtless applies to this species.

19. Cereus azureus Parmentier in Pfeiffer, Enum. Cact. 86. 1837.

Cereus seidelii Lehmann in Salm-Dyck, Cact. Hort. Dyck. 1849. 200. 1850.
Cereus azureus seidelii E. Dams, Monatsschr. Kakteenk. **14**: 157. 1904.
Piptanthocereus azureus Riccobono, Boll. R. Ort. Bot. Palermo **8**: 225. 1909.

Probably branching at base, bluish pruinose; branches elongated, slender, flexuous; ribs 6 or 7, obtuse, repand; areoles remote, with brown tomentum and grayish wool; radial spines 8 to 12,

white, with black tips; central spines 1 to 3, brown, stouter than the radials; flowers nocturnal, 10 to 12 cm. long; inner perianth-segments white, lanceolate, acuminate, 10 cm. long, the margins dentate; stamens numerous, green; style longer than the stamens, green; stigma-lobes 14, spreading, linear; ovary glabrous, bearing a few scales; fruit not known.

Type locality: Brazil.
Distribution: Brazil.

The illustration of Schumann, here cited, resembles the species of Argentina more than those of Brazil. *Cereus azureus* is reported growing in the Hanbury Garden at La Mortola, Italy, and plants are now to be seen in the New York Botanical Garden, where one flowered in 1915.

Illustration: Schumann, Gesamtb. Kakteen f. 26.

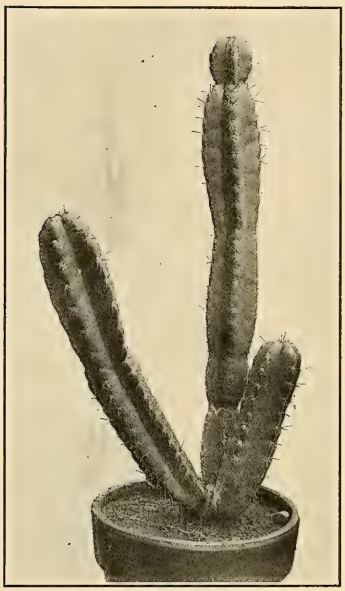

FIG. 15.—Cereus obtusus.

FIG. 16.—Cereus aethiops.

20. Cereus chalybaeus Otto in Förster, Handb. Cact. 382. 1846.

Piptanthocereus chalybaeus Riccobono, Boll. R. Ort. Bot. Palermo 8: 227. 1909.

Stems 2 to 3 meters high, with few ascending branches; ribs 6, very high on the young parts of the stems and there separated by wide intervals, more or less purplish; radial spines usually 7, but on old stems much more numerous; central spines several, a little longer than the radials, all dark brown; perianth large, about 2 dm. long and about as broad when fully expanded; flower-tube about 1 dm. long, purplish, bearing long tubercles crowned by minute scales; outer perianth-segments pinkish, narrowly oblong, the inner white, acute, sometimes toothed; filaments numerous, long-exserted beyond the throat, but shorter than the perianth-segments; style elongated, much longer than the filaments, weak; stigma-lobes many; fruit spherical, smooth, yellow.

Type locality: Not cited.
Distribution: Northern Argentina.

This species is similar to the so-called *Cereus coerulescens*, of Argentina, which was taken up as *Cereus landbeckii* by Philippi, but the former has different stems, is stouter, and usually has shorter spines.

Cereus chalybaeus was described from a plant grown in the Botanical Garden at Berlin in 1846, which we do not know; but we are accepting as this species the plant so identified and figured by T. Gürke as below cited. Our description of the flower is drawn from this illustration.

Dr. Schumann states that the species comes from near Córdoba, Argentina, and there Dr. Rose collected specimens in 1915 which have been used for this description.

Walpers (Repert. Bot. 2: 340. 1843) referred this species to *C. polychaetus*, an older species which seems to have been overlooked by recent writers.

Illustrations: Blühende Kakteen 3: pl. 135; Schumann, Gesamtb. Kakteen f. 27.

21. Cereus aethiops Haworth, Phil. Mag. 7: 109. 1830.

Cereus coerulescens Salm-Dyck, Hort. Dyck. 335. 1834.
Cereus landbeckii Philippi in Regel, Gartenflora 24: 162. 1875.
Cereus coerulescens landbeckii Schumann, Gesamtb. Kakteen 122. 1897.
Cereus coerulescens melanacanthus Schumann, Gesamtb. Kakteen 122. 1897.

Stems bluish green to purplish, 1 to 2 meters high, usually much branched; joints 3 dm. long or more, somewhat tapering toward the apex; ribs 7 or 8, low, somewhat tuberculate, obtuse or rounded, separated by acute intervals; areoles large, black; radial spines about 9 or even more, black, at least at bases and tips; central spines usually solitary, a little stouter than the radials, ascending; flower long, tubular, 22 cm. long, with a limb 12 cm. in diameter; outer perianth-segments linear-lanceolate, rose-colored; inner perianth-segments white; filaments and style included, the former attached all along the inner surface of the long tube; fruit ovoid to oblong-ovoid, more or less brownish when mature, truncate at apex, with a thick rind, smooth, somewhat glaucous, 6 cm. long; seeds black, 2 mm. long, coarsely tuberculate above, finely tuberculate at base, with a large depressed hilum.

Type locality: Brazil.

Distribution: Western border of Argentina to Brazil.

Cereus mendory Hortus (Pfeiffer, Enum. Cact. 85. 1837), *C. melanacanthus* Hortus (Schumann, Gesamtb. Kakteen 122. 1897), and *C. nigrispinus* Labouret (Schumann, Gesamtb. Kakteen 122. 1897), usually cited as synonyms of this species, are unpublished. *Cereus coerulescens fulvispinus* (Graebener, Monatsschr. Kakteenk. 19: 137. 1909) and *C. coerulescens longispinus* (Weingart, Monatsschr. Kakteenk. 16: 93. 1906) are referred here, but they have not been described.

Cereus coeruleus Lemaire (Cact. Gen. Nov. Sp. 80. 1839) was supposed to be a variety of the above species when first described but was said to be twice as large with stouter, longer spines.

We have followed Schumann and others in combining the plants from Brazil and western Argentina under one name, although there are indications that the specimens from Mendoza, Argentina, which were taken up by Philippi as *C. landbeckii*, are distinct.

Illustrations: Curtis's Bot. Mag. 68: pl. 3922; Pfeiffer, Abbild. Beschr. Cact. 2: pl. 24; Schumann, Gesamtb. Kakteen f. 28, all three as *Cereus coerulescens;* Gartenflora 24: pl. 832, as *Cereus landbeckii;* Blühende Kakteen 3: pl. 127, as *Cereus coerulescens melanacanthus*.

Figure 16 is from a photograph taken at Alto Pencoso, San Luis, Argentina, by C. Bruch in 1914; figure 17 shows a fruiting branch of *C. aethiops* from Mendoza, Argentina, brought by Dr. Rose to the New York Botanical Garden in 1915.

22. Cereus repandus (Linnaeus) Miller, Gard. Dict. ed. 8. No. 5. 1768.

Cactus repandus Linnaeus, Sp. Pl. 467. 1753.
Cereus hermannianus Suringar, Versl. Med. Akad. Wetensch. III. 2: 194. 1886.
Pilocereus repandus Schumann in Engler and Prantl, Pflanzenfam. 3^{6a}: 181. 1894, as to name.

Tall, tree-like plant, up to 10 meters high, with a much branched top; trunk 4 dm. in diameter; branches grayish green, usually upright or somewhat curved below, bearing numerous constrictions

about 2 dm. apart; ribs usually 9 or 10, rather low for this genus, about 1 cm. high; areoles 5 to 15 cm. apart, small; spines numerous, gray, acicular, the longest ones 5 cm. long; flowers nocturnal, narrowly funnelform, 7 to 8 cm. long, the limb 2.5 to 3 cm. broad, dark green except tips of inner perianth-segments; ovary bearing a few small ovate scales with a little felt in their axils; fruit dark red (occasionally white), oblong, 3 to 4 cm. long, with white flesh; seeds dull black, tuberculate

Type locality: Tropical America.
Distribution: Curaçao, Aruba, and Bonaire.

Schumann (Engler and Prantl, Pflanzenfam. 3^{6a}: 181) has confused this species with *Cephalocereus lanuginosus* and has published it under *Pilocereus repandus*.

Common on Curaçao, where it often grows in thickets, sometimes forming the dominant feature of the landscape and there known as kadoesji and breebee.

Figure 18 shows a fruit of a plant on Curaçao; figure 19 is from a photograph of the same plant taken by Dr. Britton and Dr. Shafer in 1913.

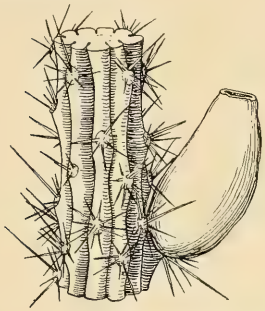

FIG. 17.—Fruiting branch of Cereus aethiops. ×0.6.

FIG. 18.—Fruit of Cereus repandus. ×0.6.

FIG. 19.—Cereus repandus.

23. Cereus grenadensis sp. nov. (See Appendix, p. 223.)

24. Cereus margaritensis Johnston, Proc. Amer. Acad. **40**: 693. 1905.

Stem columnar, erect, 5 to 8 meters high, with a trunk 1 to 2 meters long; branches ascending, gray; ribs usually 8; areoles 1 cm. apart or less; spines 11 to 15, somewhat swollen at base; radial spines about 10, acicular, 5 to 10 cm. long, spreading or reflexed; central spines 1 to 3, stouter and twice as long as the radials, porrect or reflexed; flower-bud obtuse; flowers 5 to 6 cm. long; fruit oblong, 4 cm. long; seeds black, covered with blunt tubercles.

Type locality: El Valle, Margarita Island, Venezuela.
Distribution: Known only from Margarita Island.

OTHER SPECIES DESCRIBED AS BELONGING TO THE GENUS CEREUS.

The following species have been described under *Cereus*, but their flowers are unknown or incompletely described:

CEREUS BENECKEI Ehrenberg, Bot. Zeit. **2**: 835. 1844.

Cereus farinosus Haage in Salm-Dyck, Allg. Gartenz. **13**: 355. 1845.
Cereus beneckei farinosus Salm-Dyck, Cact. Hort. Dyck. 1849. 48. 1850.
Piptanthocereus beneckei Riccobono, Boll. R. Ort. Bot. Palermo **8**: 226. 1909.

Plants 4 to 5 meters high, much branched; branches 6 to 7 cm. in diameter, the growing tips glaucous; ribs 8, strongly tuberculate, obtuse, separated by narrow intervals; areoles small, borne

on the upper side of the tubercle, black-felted; spines 1 to 5, acicular, about 1 cm. long, brownish; flowering areoles without wool; flowers small, less than 4 cm. long, greenish brown, night-blooming; inner perianth-segments rose-colored; fruit small, spineless.

Type locality: Mexico, on red lava beds.

Distribution: Central Mexico.

This species is reported by Dr. Purpus from near Tehuacán, Mexico, while Dr. Rose collected it at Iguala Canyon, Guerrero, Mexico, in 1905. This latter specimen is now growing in the New York Botanical Garden, but has never flowered. It is not a true *Cereus* nor is it referable to any genus which we know. It is characterized by its peculiar tuberculate ribs and small flowers. It was named for A. Benecke, a dealer in succulents, at Birkenwerder near Berlin. *Echinocactus farinosus* (Förster, Handb. Cact. 396. 1846) is a synonym.

Illustration: Schumann, Gesamtb. Kakteen f. 22.

CEREUS GRACILIS Haworth, Phil. Mag. **1**: 126. 1827. Not Miller, 1768.

Slender, green, nearly erect, terete, simple or with few branches; spines white, at first 2 to several but in age solitary, long; flowers and fruit unknown.

Type locality: "In America calidiore."

According to Haworth this species has the habit of *Euphorbia hystrix* but is less spiny and the spines are half as long. According to Haworth and De Candolle, this species is related to *Cereus nanus* (*Opuntia pestifer*), but a careful study of the descriptions does not suggest a very close relationship.

CEREUS TENUIS Pfeiffer, Allg. Gartenz. **8**: 407. 1840.

Described as erect, slender, green, shining, with 8 angles; intervals between the ribs acute, narrow; areoles close together, small, bearing white felt, white wool, and straight, acicular yellow spines; radial spines 8, the central solitary; flowers and origin unknown.

Cereus subintortus, *C. subintortus flavispinus* Salm-Dyck, and *C. haageanus* Salm-Dyck (Förster, Handb. Cact. 381. 1846) are, according to Förster, of this relationship.

CEREUS TRIGONODENDRON Schumann, Bot. Jahrb. Engler **40**: 413. 1908.

Tall, 15 meters high, with simple or few-branched stems; ribs 3, prominent; radial spines 6; central spine 1, about 6 mm. long; flowers described as about 10 cm. long and red.

This species was very briefly described by Schumann. Vaupel (Monatsschr. Kakteenk. **23**: 184. 1913) has described the species at more length but not in sufficient detail to enable us to place it. It is very tall with few strict branches and only 3-angled stems, and with red flowers. It probably is not a *Cereus* nor is it like any other Peruvian cacti.

Type locality: Department of Loreto, Peru.

Distribution: Northeastern Peru.

E. C. Erdis, in 1915, collected at Pumachaca, at an altitude of about 1,500 meters, a very peculiar cactus which may be referable here. The small plant which he sent in had only 4 thin wing-like ribs, but the newer growth has 5 ribs; the spines are 6 to 9, dark brown, acicular. A small live plant is in the collection at Washington.

Illustration: Bot. Jahrb. Engler **40**: pl. 10.

CEREUS MULTANGULARIS (Willdenow) Haworth, Suppl. Pl. Succ. 75. 1819.

Cactus multangularis Willdenow, Enum. Pl. Suppl. 33. 1813.
?*Cereus multangularis pallidior* Pfeiffer, Enum. Cact. 78. 1837.
Echinocereus multangularis Rümpler in Förster, Handb. Cact. ed. 2. 825. 1885.
Echinocereus multangularis pallidior Rümpler in Förster, Handb. Cact. ed. 2. 825. 1885.

Cactus multangularis, when first described, was not sufficiently characterized for identification. Schumann associated the name *multangularis* with a Peruvian plant and referred considerable synonymy to it. We know no plant of Peru which answers his description.

To this species Schumann refers *Cereus flavescens* (Pfeiffer, Enum. Cact. 79. 1837) and with it should be referred *Echinocereus flavescens* (Rümpler in Förster, Handb. Cact. ed. 2. 826. 1885). *Cereus multangularis* var. *albispinus* and var. *prolifer* Salm-Dyck (Hort. Dyck. 62. 1834) and var. *rufispinus* Fobe (Monatsschr. Kakteenk. **18**: 75. 1908) are unpublished names.

Cereus kageneckii Gmelin (Pfeiffer, Enum. Cact. 77. 1837), also, according to the Index Kewensis, *Cactus hageneckii* (De Candolle, Prodr. **3**: 463. 1828) and *Cereus ochracanthus* (Pfeiffer, Enum. Cact. 78) were published as synonyms.

In the Engelmann Herbarium is a single specimen labeled "*Cereus multangularis*" with the following note: "Columnar, similar to *serpentinus*, coll. Germantown, Pa., October 27, 1869." We believe this plant is *Nyctocereus serpentinus*.

Dr. A. Hrdlička collected in March 1913, in the mountains southeast of Nasea, Peru, at an altitude of 5,000 to 7,000 feet, a curious plant which may represent the one referred here by Schumann. It is a low cespitose plant, rarely 2 feet high, with numerous low almost indistinct ribs, nearly hidden by the numerous spines; areoles approximate, 4 to 5 mm. apart, felted and spiny; spines 25 or more, brown or white with brown tips, the longest ones 12 mm. long; flower-buds scaly, woolly, and setose in their axils. Living specimens were sent to Washington, but these eventually died without flowering.

Cereus lecchii (Pfeiffer, Enum. Cact. 78. 1837; *Cactus lecchii* Colla and *C. lanuginosus aureus* Colla, Hort. Ripul. 25. 1825; *Echinocactus lecchii* Don in Sweet, Hort. Brit. ed. 3. 283. 1839) is referred here by Schumann. *Cereus lanuginosus aureus* (Pfeiffer, Enum. Cact. 78. 1837) was given as a synonym of *C. lecchii*. *Cactus lecchii* was illustrated by Colla in his Fourth appendix to the Hortus Ripulensis (Mem. Accad. Sci. Torino **35**: pl. 2).

CEREUS LIMENSIS Salm-Dyck, Allg. Gartenz. **13**: 353. 1845.

Echinocereus limensis Rümpler in Förster, Handb. Cact. ed. 2. 824. 1885.
Cereus multangularis limensis Maass, Monatsschr. Kakteenk. **15**: 119. 1905.

Stems erect, thick, very green; ribs 12, obtuse, subrepand; areoles close together, oval, filled with yellow tomentum; spines acicular, setaceous, rigid, the central ones 8 to 10, divergent, yellowish red, one longer than the others; radial spines 20 to 25, reddish yellow above, white below.

The above is a free translation of the original.

This species is not determinable but was referred by Schumann to *Cereus multangularis*.

Echinocereus multangularis limensis Lemaire (Rümpler in Förster, Handb. Cact. ed. 2. 824. 1885) was given as a synonym of *Echinocereus limensis*.

CEREUS LANGLASSEI, Monatsschr. Kakteenk. **14**: 145. 1904. Mentioned as a seedling from Paris. Weingart (Monatsschr. Kakteenk. **29**: 105. 1919) described the plant after it had made some growth and compared it with *C. eburneus* (*Lemaireocereus griseus*.)

CEREUS HORIZONTALIS Gillies in Sweet, Hort. Brit. ed. 3. 285. 1839. Described as horizontal with stems of 5 or 6 angles.

CEREUS AMBLYOGONUS G. Don in Sweet, Hort. Brit. ed. 3. 284. 1839. Described as "blunt angled" and introduced from South America.

CEREUS CAUDATUS Gillies in Sweet, Hort. Brit. ed. 3. 285. 1839. Described only as "tailed" and introduced from Chile in 1828.

CEREUS LONGIFOLIUS Karwinsky in Sweet, Hort. Brit. ed. 3. 286. 1839. Described as "long-leaved."

CEREUS DE LAGUNA Haage in Förster, Handb. Cact. 433. 1846. Said to be similar to *C. geometrizans* and *C. eburneus* and to be from Brazil.

CEREUS REGALIS Haworth in Sprengel, Syst. **2**: 496. 1825. Described as erect, 9-ribbed, and with elongated yellow equal spines.

Cereus ovatus Don (Loudon, Hort. Brit. 195. 1830; *Cactus ovatus* Gillies) and *Cereus decorus* Loddiges (Voigt, Hort. Suburb. Calcutt. 62. 1845) were both introduced into India in 1840 but are not now known nor have they been described.

Cereus flavispinus Roezl in Morren (Belg. Hort. **24**: 39. 1874), collected by Roezl probably in the high mountains above Lima, was never formally published.

The following names of *Cereus* we have been unable to refer to any of the species otherwise mentioned in this work:

Cereus aculeatus Förster, Handb. Cact. 433. 1846.
albertinii Fobe, Monatsschr. Kakteenk. **18**: 175. 1908.
atrovirens Förster, Handb. Cact. 433. 1846.
concinnus Haage in Schumann, Gesamtb. Kakteen 167. 1897.
damacaro Haage in Schumann, Gesamtb. Kakteen 167. 1897.
incrassatus Link and Otto, Verh. Ver. Beförd. Gartenb. **6**: 432. 1830.
jacquinii Rebut in Schumann, Gesamtb. Kakteen 167. 1897.
karwinskii Haage in Schumann, Gesamtb. Kakteen 167. 1897.
longipendunculatus Förster, Handb. Cact. 433. 1846.
lormata Maass, Monatsschr. Kakteenk. **15**: 119. 1905.
ophites Lemaire, Monatsschr. Kakteenk. **4**: 173. 1894.
pruinatus, Monatsschr. Kakteenk. **11**: 181. 1901.
robustus Schumann, Monatsschr. Kakteenk. **13**: 111. 1903.
rogalli Schumann, Monatsschr. Kakteenk. **9**: 96. 1899.
salpingensis Schumann, Monatsschr. Kakteenk. **11**: 181. 1901.
schoenemannii Hildmann, Monatsschr. Kakteenk. **5**: 43. 1895.
spathulatus Förster, Handb. Cact. 433. 1846.
steckmannii Jacobi, Monatsschr. Kakteenk. **5**: 43. 1895.
tellii, Monatsschr. Kakteenk. **5**: 43. 1895. A name from Hildmann's Catalogue.
trichocentrus Förster, Handb. Cact. 433. 1846.
verschaffeltii Haage in Schumann, Gesamtb. Kakteen 167. 1897.

2. MONVILLEA gen. nov.

Night-blooming cacti with long, slender, half-erect stems, often forming thickets; flowers borne toward the top of the stem, of medium size, without felt or spines; tube proper in typical species slender, tapering into a short throat; scales minute; outer perianth-segments greenish or pinkish; inner perianth-segments white or yellow; stamens white, not in definite rows but scattered over the throat; style slender, white, with linear stigma-lobes; flower-tube rigid after anthesis, withering on the ovary; scales on the ovary minute, their axils naked; fruit glabrous, red, plump, spineless; flesh of fruit white, juicy; seeds small, black.

Type species: *Cereus cavendishii* Monville.

The generic name commemorates M. Monville, a well-known student of this family. We recognize 7 species, all South American.

Key to Species.

Flower-tube slender, straight; stamens and style more or less exserted.
  Ribs 6 to 10.
    Flowers white ..... 1. *M. cavendishii*
    Flowers yellow ..... 2. *M. insularis*
  Ribs 3 to 5.
    Plants erect, bluish green, more or less spotted; branches with 3 or 4 sharp ribs, these deeply serrate ..... 3. *M. spegazzinii*
    Plants decumbent; branches with 4 or 5 rounded ribs ..... 4. *M. phatnosperma*
Flower-tube short and stout, somewhat curved; stamens and style included.
  Spines subulate, often elongated.
    Fruit globular; flower strongly angled; flower-bud pointed ..... 5. *M. diffusa*
    Fruit oblong; flower not strongly angled; flower-bud obtuse ..... 6. *M. maritima*
  Spines acicular, all very short ..... 7. *M. amazonica*

1. Monvillea cavendishii (Monville).

Cereus serpentinus splendens Salm-Dyck in Lemaire, Cact. Gen. Nov. Sp. 79. 1839.
Cereus cavendishii Monville, Hort. Univ. **1**: 219. 1840.
Cereus paxtonianus Monville in Salm-Dyck, Cact. Hort. Dyck. 1849. 211. 1850.
Cereus splendens Salm-Dyck, Cact. Hort. Dyck. 1849. 214. 1850.
Cereus saxicola Morong, Annals N. Y. Acad. Sci. **7**: 121. 1893.
Cereus euchlorus Weber in Schumann, Gesamtb. Kakteen 84. 1897.
Cereus rhodoleucanthus Schumann, Monatsschr. Kakteenk. **9**: 187. 1899.
Eriocereus cavendishii Riccobono, Boll. R. Ort. Bot. Palermo **8**: 239. 1909.

In cultivation more or less branched at base, 1 to 3 meters high, suberect or clambering, green, 2 to 3 cm. in diameter; ribs 9 or 10, low and rounded; areoles small, about 1 cm. apart; spines acicular,

8 to 12, brown; flower 10 to 12 cm. long, the tube 5 to 6 cm. long; outer perianth-segments pinkish; inner perianth-segments white; ovary small, bearing a few very small scales, these broader than long, with minute brown chartaceous tips; fruit globular, 4 to 5 cm. in diameter.

Type locality: Carthagene.*

Distribution: Brazil, northern Argentina and Paraguay.

This is one of the best flowering species we have in cultivation. The flowers open at night and appear more or less abundantly from April to September.

The species was named for William Spencer Cavendish, Duke of Devonshire, who had a magnificent collection of plants at Chatsworth.

Cereus anguiniformis (Weingart, Monatsschr. Kakteenk. 18: 6. 1908) and *C. saxicola anguiniformis* Riccobono (Boll. R. Ort. Bot. Palermo 8: 252. 1909) probably belong here.

We have referred here *Cereus euchlorus*, which originally came from São Paulo, Brazil. We have specimens growing which were obtained under this name from M. Simon, of St. Ouen, Paris, in 1901.

FIG. 20.—Monvillea cavendishii.

FIG. 21.—Monvillea insularis. ×0.5.

Botanists have been much in doubt as to the relationship of this species. Schumann in his Monograph refers it along with *Cereus striatus* (now *Wilcoxia*) to his series *Tenuiores*. In his Nachträge, published in 1903, he places it with *Cereus obtusangulus* (now *Zygocactus*) in his series *Anomali*, but in his Keys, published about the same time, he again has it in the series *Tenuiores*. Berger places it in his subgenus *Piptanthocereus*, while Riccobono has recently transferred it to his genus *Eriocereus*.

Dr. Schumann discusses *Cereus lauterbachii* Schumann (Bull. Herb. Boiss. II. 3: 250. 1903) in connection with this species, but does not point out how they differ.

Both the names *Cereus cavendishii* and *C. paxtonianus* were in general use until Schumann in 1897 suggested that the plants are the same. Sir Joseph Hooker in 1899 united them definitely under the name of *Cereus paxtonianus*.

Illustrations: Monatsschr. Kakteenk. 19: 77, as *Cereus saxicola;* Monatsschr. Kakteenk. 13: 12, as *Cereus rhodoleucanthus;* Curtis's Bot. Mag. 125: pl. 7648, as *Cereus paxtonianus*.

*When first published it was stated that the species came from "Carthagene." Schumann says probably South America, possibly Brazil, while Morong collected it in central Paraguay.

1. Top of stem of *Cereus validus*.
2. Top of flowering stem of same.
3. Top of flowering branch of *Monvillea cavendishii*.
4. Top of branch with fruit of same.

(Natural size.)

Plate III, figure 3, shows a flowering branch in the collection of the New York Botanical Garden; figure 4 shows the fruit from a plant in the same collection. Figure 20 is from a photograph taken in 1917 by Dr. Shafer at Catilegua, Argentina.

2. **Monvillea insularis** (Hemsley).

Cereus insularis Hemsley, Voyage of Challenger Bot. 1^2: 16. 1884.

Creeping or clambering, forming a dense thicket, much branched; branches nearly cylindric, 2.5 to 3 cm. in diameter, 6-angled; spines 12 to 15, unequal, spreading, terete, yellow; flowers described as yellow, 12.5 cm. long; ovary and flower-tube bearing only a few minute scales, but no spines or hairs; flower-tube very slender; perianth-segments in several series; filaments and style protruding; stigma-lobes 13, radiating.

Type locality: St. Michael's Mount, off Brazil, 5° S. latitude.

Distribution: Known only from the type locality.

This plant is noteworthy as inhabiting an island on which no other cactus exists. It is the most eastern in natural distribution of all cactus species. So far as we are informed, it has never been in cultivation.

Illustration: Voyage of Challenger Bot. 1^2: pl. 14, as *Cereus insularis.*

Figure 21 is copied from the plate above cited.

3. **Monvillea spegazzinii** (Weber).

Cereus spegazzinii Weber, Monatsschr. Kakteenk. 9: 102. 1899.
Cereus anisitsii Schumann, Monatsschr. Kakteenk. 9: 185. 1899.

Erect, strongly 3-angled or ribbed, bluish green, more or less spotted with white; ribs strongly undulate or serrate; spines on young branches brown to black, 3 at an areole, 5 mm. long, with broad conic bases; on old wood 6 at an areole, of these 5 radial, 1 central; bud and flower rigid and erect, but after anthesis abruptly reflexed; flowers 11 to 12 cm. long, narrow, funnelform; outer perianth-segments purplish, the inner nearly white, serrate above, acuminate.

FIG. 22.—Monvillea spegazzinii.

Type locality: Near Resistencia, Chaco Territory, Argentina.

Distribution: Paraguay and northeastern Argentina.

Cereus marmoratus Zeissold (Cat. 1899), unpublished, is referred by Gürke (Monatsschr. Kakteenk. 18: 131. 1908) to *Cereus anisitsii;* Gürke (Monatsschr. Kakteenk. 16: 146. 1906) also refers *Cereus lindenzweigianus,* name only, to *C. anisitsii.*

Illustrations: Monatsschr. Kakteenk. 12: 193; Schumann, Gesamtb. Kakteen Nachtr. f. 5; Schelle, Handb. Kakteenk. f. 31; Rev. Hort. Belge 40: after 184*, as *Cereus spegazzinii;* Blühende Kakteen 2: pl. 107, as *Cereus anisitsii.*

Figure 22 is from a photograph of the type specimen given to Dr. Rose by Dr. Spegazzini.

*In the Revue de L'Horticulteur for 1914 was published a number of plates, mostly of cacti grown by Frantz de Laet. These plates are not numbered and we have indicated their position by the page they follow. Most of them were reproduced in De Laet's Catalogue Général.

4. **Monvillea phatnosperma** (Schumann).

Cereus phatnospermus Schumann, Monatsschr. Kakteenk. 9: 186. 1899.

Decumbent, 1 to 2 meters long; branches 4 or 5-ribbed, bright green, 2.5 cm. in diameter; ribs rounded, somewhat concave on the sides; spines brown, subulate; radial spines 5 or 6, spreading, 15 mm. long; central spines, when present, straight or somewhat curved, up to 2.5 cm. long; flowers white, 12 cm. long; ovary subnaked, narrow, cylindric, about 3 cm. long.

Type locality: Near Porongo, Paraguay.

Distribution: Paraguay.

The plant is known to us only from the description above cited.

5. **Monvillea diffusa** sp. nov.

Stems slender, 4 to 5 cm. in diameter, at first erect, afterwards with long arching branches, when growing in the open often forming thickets 2 to 5 meters in diameter; ribs high and thin, usually 8; areoles 2.5 to 3 cm. apart, gray-felted; radial spines 6 to 10, spreading, acicular, 6 to 12 mm. long; central spines 1 to 3, one usually much elongated, 2 to 3 cm. long, subulate, gray with black tips; flowers 7.5 cm. long, the tube strongly ribbed; scales on the flower-tube ovate, acute; ovary globose with elongated tubercles or ribs; scales on ovary minute, acute.

FIG. 23.—Monvillea diffusa. ×0.5.

Common on the hillsides of the Catamayo Valley in southern Ecuador.

Collected by J. N. Rose, A. Pachano, and George Rose, October 3, 1918 (No. 23325). Figure 23 shows a flower and young fruit from the type collection.

6. **Monvillea maritima** sp. nov.

Stems slender, 5 to 8 cm. in diameter, at first erect, sometimes 4 to 5 meters high, growing among shrubs and trees and often high-clambering, either simple or with few distant branches, these weak, ascending or drooping; ribs 4 to 6, somewhat undulating, the areoles borne in the depressions, 2 to 3 cm. apart; spines about 8, all gray, with black tips; central spines 1 or 2, one much longer and stouter, 5 to 6 cm. long; upper part of flower-bud nearly globular, merely acute at apex; flowers 6 cm. long; flower-tube faintly angled without, naked for about 3 cm. above the base of the style; ovary oblong, faintly angled, the scales broad with a minute scarious tip.

Common in the thickets along the coast of southern Ecuador near Santa Rosa where it was collected by J. N. Rose and George Rose, October 1918 (No. 23495).

The flowers of this species are similar to those of *M. diffusa*, but the two plants grow in very different situations and are of different habit. *M. diffusa* grows on the mountain-side of a very arid interior valley at an altitude of about 2,170 meters, while *M. maritima* is from a humid region near sea-level; the former grows in the open while *M. maritima* grows among bushes and trees.

7. **Monvillea amazonica** (Schumann).

Cereus amazonicus Schumann in Vaupel, Monatsschr. Kakteenk. 23: 164. 1913.

At first erect, up to 5 meters long, not much branched; ribs 7, low, acute; areoles about 17 mm. apart; spines about 15, acicular, weak, 8 mm. long; flowers borne on the upper part of the stem but not at the tip, straight, 8 cm. long; areoles on ovary and flower-tube without hairs, bristles, or spines, subtended by minute scales; perianth-segments numerous, obovate, rounded above; ovary and fruit oblong, capped by the withering flower.

Type locality: Loreto, Peru.

Distribution: On the upper Amazon in eastern Peru.

This is evidently a remarkable species. It is known to us only from the description and illustration, and may very likely represent a distinct generic type.

Illustration: Monatsschr. Kakteenk. 23: 165, as *Cereus amazonicus*.

MONVILLEA sp.

Stems slender, sometimes 3 to 4 meters high, nearly simple, rather weak and often supported by other plants, 3 to 5 cm. in diameter; ribs about 8, 1 cm. high; areoles 1 to 1.5 cm. apart; radial spines about 10, somewhat unequal, the longest about 1 cm. long; central spines 2 or 3, longer and stouter than the radial, usually about 2 cm. long, black at tip; flowers and fruit not seen.

Collected by J. N. Rose and George Rose near Guayaquil, Ecuador, August 11, 1918 (No. 22117).

This species was quite common in the flat country northwest of Guayaquil associated with a larger arborescent cactus, a species of *Lemaireocereus*, and at first was supposed to be its juvenile form. Unfortunately, no flowers or fruit were seen. Living specimens were brought back to the New York Botanical Garden, but these have not yet flowered. We are not certain of the generic position of this plant, but it so much resembles *Monvillea maritima* in habit that we suspect that its relationship is here.

3. CEPHALOCEREUS Pfeiffer, Allg. Gartenz. 6: 142. 1838.

Cephalophorus Lemaire, Cact. Aliq. Nov. xii. 1838. Not *Cephalophora* Cavanille. 1801.
Pilocereus Lemaire, Cact. Gen. Nov. Sp. 6. 1839.

Elongated cacti, various in habit, mostly columnar and erect, sometimes much branched with a short trunk or in one species with spreading and procumbent branches; in some species the flowering areoles develop an abundance of wool which confluently forms a dense mass called a pseudocephalium either at the top or on one side near the top; in others long wool or hairs grow from the areoles but a pseudocephalium is not formed; in others the flowers are produced in a circle at the top and the bristles and fruit afterwards form a collar at the base of the new growth; in other species neither wool nor hairs are produced in the flowering areoles; flowers nocturnal, short-campanulate to short-funnelform or pyriform, straight or curved; perianth persisting on the ripening fruit, except in one species; fruit usually depressed-globose, sometimes oblong; seeds black, smooth or tuberculate.

We know 48 species, distributed from southern Florida and northern Mexico to eastern Brazil and Ecuador. The type species is *Cactus senilis* Haworth, which is also the type of Lemaire's genera *Cephalophorus* and *Pilocereus*. The name *Cephalocereus* is from the Greek, signifying headed-cereus, with reference to the pseudocephalium of the typical species.

KEY TO SPECIES.

A. Flowering areoles confluent, forming a pseudocephalium.
  Pseudocephalium lateral.
    Ovary bearing few distant scales; areoles of the flower with tufts of short wool; plants simple, tall, columnar.
      Plant cylindric; top rounded; bristles of pseudocephalium twice as long as wool. 1. *C. senilis*
      Plant tapering to the apex; bristles of pseudocephalium little longer than the wool. 2. *C. hoppenstedtii*
    Ovary naked.
      Plant unbranched. 3. *C. purpureus*
      Plant branched at the base.
        Ribs 12 to 17; flowers 6 to 7 cm. long. 4. *C. fluminensis*
        Ribs up to 23; flowers 4 cm. long. 5. *C. dybowskii*
  Pseudocephalium terminal. 6. *C. macrocephalus*
AA. Flowering areoles not confluent, though sometimes close together, not forming a pseudocephalium.
  Flower-tube strongly bent about middle; areoles wholly without hairs; plant blue. 7. *C. pentaedrophorus*
  Flower-tube straight or a little curved at the base.
    Ribs 10 to 18; flowers red.
      Ribs 15 to 18; perianth-segments not reflexed. 8. *C. polylophus*
      Ribs 8; perianth-segments reflexed. 9. *C. euphorbioides*
    Ribs 4 to 13; flowers mostly whitish to purplish.
      Perianth falling away from the ovary by abscission. 10. *C. russelianus*
      Perianth withering-persistent (so far as known).
        Ribs strongly tubercled.
          Spines all brown, the radials widely spreading, the centrals stout, subulate. 11. *C. gounellei*
          Spines all yellow, acicular, the radials only slightly spreading. 12. *C. zehntneri*
        Ribs not tubercled.
          Flower-tube curved at base; areoles of the stem all densely long-woolly. 13. *C. leucostele*
          Flower-tube straight; only flowering areoles, if any, long-woolly.

Key to Species—continued.

AA. Flowering areoles not confluent, though sometimes close together, not forming a pseudocephalium—*continued.*
Ovary well-developed; flower-tube little scaly or without scales.
Flowering areoles without wool, or wool very short.
Fruit oblong to ovoid....14. *C. smithianus*
Fruit globose or depressed.
Spines acicular; berry large.
Perianth-segments rounded, acute, or mucronate.
Plant grayish green; at least the perianth-segments rounded or mucronate.
Outer perianth-segments rounded....15. *C. bahamensis*
All perianth-segments rounded....16. *C. deeringii*
Plant glaucous green when young, dull green when old; outer perianth-segments acute.
Much branched, the branches ascending; ribs 10 to 13; style exserted....17. *C. robinii*
Little branched, the branches nearly erect; ribs 9 or 10; style scarcely exserted; young growth very glaucous....18. *C. keyensis*
Perianth-segments retuse....19. *C. monoclonos*
Spines subulate; berry small....20. *C. scoparius*
Flowering areoles definitely long-woolly.
Ribs 5 to 13, separated by narrow valleys.
Ribs 8 mm. high or higher.
Plant light green to dark green.
Spines short, subulate....21. *C. moritzianus*
Spines slender, acicular.
Wool of flowering areoles sparse, not matted....22. *C. arrabidae*
Wool of flowering areoles mostly copious, matted.
Wool of flowering areoles brown....23. *C. urbanianus*
Wool of flowering areoles white.
Plant bright green, shining.
Joints slender, dark green; wool short....24. *C. nobilis*
Joints stout, light green; wool long....25. *C. barbadensis*
Plant dull green, not shining.
Wool elongated, up to 5 to 7 cm. long....26. *C. millspaughii*
Wool short, 2 cm. long or less.
Ribs 1 to 2 cm. high.
Only the flowering areoles woolly....27. *C. swartzii*
Both flowering and flowerless areoles of young joints woolly....28. *C. polygonus*
Ribs 8 mm. high or less....29. *C. gaumeri*
Plant, at least young joints, blue or bluish green, glaucous.
Young spines yellow.
Flower 7 to 8 cm. long....30. *C. chrysacanthus*
Flower 5 to 6 cm. long.
Ribs 6 to 8....31. *C. maxonii*
Ribs mostly 9 to 12.
Ribs 13....32. *C. piauhyensis*
Ribs 9 or 10.
Perianth-segments rounded or mucronate.
Young joints bright blue; ribs low....33. *C. lanuginosus*
Young joints bluish green, glaucous; ribs high....34. *C. brooksianus*
Perianth-segments acute....35. *C. royenii*
Young spines brown or nearly black.
Areoles approximate, their spines overlapping....36. *C. robustus*
Areoles separated, their spines not overlapping.
Ribs 9 to 12.
Wool short, 2 cm. long....37. *C. cometes*
Wool 10 cm. long....38. *C. leucocephalus*
Ribs 7 to 9.
Ribs strongly horizontally grooved below the areoles.
Flowers rose-red....39. *C. sartorianus*
Flowers brown....40. *C. palmeri*
Ribs not grooved....41. *C. tweedyanus*
Color of plant and of young spines unknown.
Mexican....42. *C. alensis*
Colombian....43. *C. colombianus*
Ribs only 5 to 6 mm. high; plant green....44. *C. purpusii*
Ribs 4 to 6, separated by broad valleys.
Glaucous, up to 10 meters high; flowers 6 to 8 cm. long....45. *C. catingicola*
Bright green, up to 3 meters high; flowers about 5 cm. long....46. *C. brasiliensis*
Ovary very short and flat; flower-tube scaly....47. *C. phaeacanthus*
AAA. Species not grouped....48. *C. ulei*

1. Cephalocereus senilis (Haworth) Pfeiffer, Allg. Gartenz. **6**: 142. 1838.

Cactus senilis Haworth, Phil. Mag. **63**: 31. 1824.
Cactus bradypus Lehmann, Ind. Sem. Hamburg 17. 1826.
Cereus senilis De Candolle, Prodr. **3**: 464. 1828.
Cephalophorus senilis Lemaire, Cact. Aliq. Nov. xii. 1838.
Pilocereus senilis Lemaire, Cact. Gen. Nov. Sp. 7. 1839.
Echinocactus senilis Beaton, Loudon's Gard. Mag. **15**: 550. 1839.
Echinocactus staplesiae Tate, Loudon's Gard. Mag. **16**: 27. 1840.

Plants 6 to 10 or even 15 meters high, columnar, simple or rarely branched above, sometimes branched at base; ribs numerous; pseudocephalium developing on plants when 6 meters high, broadening above, rarely confined to one side but usually encircling the top of the plant; areoles closely set; the ones at base of old plants producing weak, gray bristles 2 to 3 dm. long, the ones in the pseudocephalium producing similar but shorter bristles intermixed with dense, tawny wool, 4 to 6 cm. long; flower, including the ovary, 5 cm. long, rose-colored; scales few on the tube; fruit obovoid, 2.5 to 3 cm. long, rose-colored, capped by the chartaceous base of the flower, bearing a few minute scales with hairs in their axils.

Type locality: Mexico.

Distribution: Hidalgo and Guanajuato, Mexico.

Cephalocereus senilis has long been considered a great curiosity and small plants are shipped in quantities to Europe. The young plants are covered with long white silky hairs resembling a beard and hence the name old man cactus, and similar names. Large plants are not often seen since the species grows in regions difficult of access. It is very common on limestone hills of eastern Hidalgo, where it is often the most conspicuous plant in the landscape. Large individuals are common here and are often 15 meters high. Very little wood-tissue is developed and the largest individuals can easily be cut down with a pick or small knife.

Salm-Dyck (Cact. Hort. Dyck. 1844. 24. 1845) named two varieties of *Pilocereus senilis: longispinus* and *flavispinus;* later (Cact. Hort. Dyck. 1849. 40, 186. 1850) he described *P. senilis longisetus,* saying nothing about *longispinus* and *flavispinus.*

Cereus bradypus Lehmann and *Melocactus bradypus* Lehmann (Steudel, Nom. ed. 2. **1**: 333. 1840; **2**: 122. 1841) are cited as synonyms of *Cereus senilis.*

Illustrations: Schumann, Gesamtb. Kakteen f. 40; Grässner, Haupt-Verz. Kakteen 2; Knippel, Kakteen pl. 1; Engler and Prantl, Pflanzenfam. 3^{6a}: pl. opp. p. 180; f. 60; Safford, Ann. Rep. Smiths. Inst. **1908**: f. 15, 16, all as *Cephalocereus senilis;* Förster, Handb. Cact. ed. 2. f. 91, 92; Monatsschr. Kakteenk. **4**: 124, 125; Rev. Hort. **61**: f. 139; **62**: f. 38, 39; Rümpler, Sukkulenten f. 78; Dict. Gard. Nicholson Suppl. f. 634, all as *Pilocereus senilis;* Monatsschr. Kakteenk. **1**: 32, as *Pilocereus senilis cristatus;* Nov. Act. Nat. Cur. **16**: pl. 12, as *Cactus bradypus.*

Figure 24 is from a photograph of a small plant in the collection of the New York Botanical Garden.

2. Cephalocereus hoppenstedtii (Weber) Schumann in Engler and Prantl, Pflanzenfam. 3^{6a}: 181. 1894.

Pilocereus hoppenstedtii Weber, Cat. Pfersdorff. 1864 (according to Schumann).
Pilocereus hagendorpi Regel, Gartenflora **18**: 220. 1869.
Pilocereus lateralis Weber, Dict. Hort. Bois 966. 1898.
Cereus hoppenstedtii Berger, Rep. Mo. Bot. Gard. **16**: 70. 1905.

Slender, columnar, said sometimes to reach 10 meters in height, but in cultivation much lower, often bent or clambering, the apex tapering; ribs low, close together, 20 or more, the whole plant hidden under the numerous spines; areoles close together; radial spines 14 to 18, very short, white; central spines 5 to 8, the longest one sometimes 7.5 cm. long, usually reflexed, brownish; pseudocephalium at the top of the plant but to one side (said to be on the north side); flower described as 7.5 cm. long, whitish, with rosy tips, bell-shaped; fruit not known.

Type locality: Zapotitlan, near Tehuacán, Mexico.

Distribution: Southern Mexico.

This plant is clearly a close relative of *Cephalocereus senilis.*

So far as we know, the type has not been preserved. The species is sometimes cultivated, but it has never done well with us under glass. Mr. Berger was able to grow it at La Mortola, Italy.

There has long been considerable confusion regarding the characters of this species, partly because other cacti have been confused with it. For instance, the only specimens (several flowers) in the Engelmann Herbarium, so named, although from the region of this species, are those of a *Pachycereus*.

Illustrations: Knippel, Kakteen pl. 29; Grässner, Haupt-Verz. Kakteen 29. 1912; Möllers Deutsche Gärt. Zeit. **29**: 355. f. 10; Schelle, Handb. Kakteenk. f. 38, as *Pilocereus hoppenstedtii;* Bull. Soc. Acclim. France **52**: f. 15, as *Pilocereus lateralis*.

FIG. 24.—Cephalocereus senilis.

FIG. 25.—Cephalocereus purpureus.

3. Cephalocereus purpureus Gürke, Monatsschr. Kakteenk. **18**: 86. 1908.

Columnar, upright, unbranched, 3 meters high or more; ribs 12 to 15, broad, low, separated by narrow intervals, marked by upturned V-shaped depressions, one from the top of each areole; areoles large, longer than broad, white-woolly and spiny; radial spines 15 to 20, acicular, white, short, 1 cm long or less; central spines 8 to 10, the longer ones 5 cm. long, brown; pseudocephalium on the west side of the plant, confined to only a few of the ribs (3 to 7); flowers open at night, closing in the morning, 4 to 5 cm. long; tube and outer perianth-segments pinkish; inner perianth-segments white; stamens and style included; fruit small; seeds black, roughened, large at the top, narrowed at base.

Type locality: Serra do Sincorá, Bahia, Brazil, 800 to 1,200 meters altitude.
Distribution: Southern central Bahia, Brazil.

Photographs and an abundance of flowers and seed of this most interesting species were obtained by Dr. Rose from Dr. L. Zehntner, who had two plants growing in his garden at Joazeiro, Bahia.

Figure 25 is from a photograph of one of the plants above mentioned; figure 28 shows a spine-areole of its stem; figure 27 shows the flower.

4. **Cephalocereus fluminensis** (Miquel).

Cactus melocactus Vellozo, Fl. Flum. 205. 1825. Not Linnaeus, 1753.
Cereus fluminensis Miquel, Bull. Sci. Phys. Nat. Neerl. **1838**: 48, 1838.
Pilocereus vellozoi Lemaire, Rev. Hort. **1862**: 427. 1862.
Cephalocereus melocactus Schumann in Martius, Fl. Bras. 4^2: 215. 1890.
Pilocereus melocactus Schumann, Monatsschr. Kakteenk. **3**: 20. 1893.
Cereus melocactus Berger, Rep. Mo. Bot. Gard. **16**: 62. 1905.*

Growing generally in clumps, clambering over rocky cliffs; branches erect, spreading or pendent, 1 to 2 meters long; ribs 12 to 17, 1 to 1.5 cm. high, acute, separated by acute intervals; spines acicular, yellow, the longest ones 3 cm. long; pseudocephalium on one side of the branch, of a dense white felt, 2 to 3 cm. thick, intermixed with long yellow bristles, 4 to 7 cm. long; areoles close together, circular, with short white wool but with no long hairs; flowers 6 to 7 cm. long; style long-exserted; fruit bright red to purple, obovoid, 3 cm. long, naked, almost hidden in the mass of white wool of the pseudocephalium; seeds black, 1 mm. in diameter, tuberculate.

Type locality: On island in harbor of Rio de Janeiro, Brazil.

Distribution: On rocky cliffs and islands along Brazilian coast from Rio de Janeiro to Cabo Frio.

This plant was first collected and figured by Vellozo about 1790 and named *Cactus melocactus*, a name which had already been used by Linnaeus

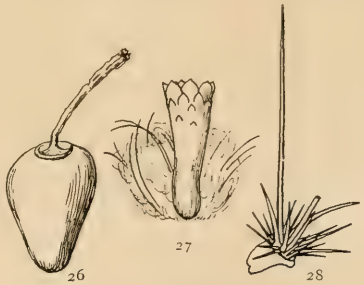

FIG. 26.—Fruit of Cephalocereus fluminensis. ×0.7.
FIG. 27.—Flower of Cephalocereus purpureus. ×0.7.
FIG. 28.—Cluster of spines of same. ×0.7.

FIG. 29.—Cephalocereus fluminensis.

for another plant. Although this species is very common on all the rocky knolls and outcrops about the harbor of Rio de Janeiro, it has rarely been collected and no living or herbarium material was in the Washington and New York collections until Dr. Rose collected it in Brazil in 1915.

*Schumann (Martius, Fl. Bras. 4^2: 216. 1890) erroneously refers this binomial to Vellozo.

Illustrations: Vellozo, Fl. Flum. 5: pl. 20, as *Cactus melocactus;* Martius, Fl. Bras. 4^2: pl. 43; Engler and Prantl, Pflanzenfam. 3^{6a}: f. 65, B, as *Cephalocereus melocactus;* Monatsschr. Kakteenk. 3: 25, as *Pilocereus melocactus.*

Figure 29 is from a photograph taken at Rio de Janeiro by Paul G. Russell in 1915; figure 26 shows the fruit as drawn by A. Löfgren.

Cereus ferox Haworth (Phil. Mag. 7: 109. 1830) may be of this relationship. It is described as upright, stout, oblong, terete, 9 inches high, 2 inches in diameter, dark green; ribs about 18, densely covered with spreading yellow spines; radial spines about 6; central spines 4 or 5, one twice as long as the others, much stouter, up to an inch long. This species was introduced from Brazil by Loddiges, in whose collection it was seen and described by Haworth. It is stated to be near *Cereus multangularis.* Förster and Schumann did not know the species.

5. Cephalocereus dybowskii (Gosselin).

Cereus dybowskii Gosselin, Bull. Soc. Bot. France 55: 695. 1908.

Stems much branched at the base, sending up many strict, usually simple branches 2 to 4 meters high, 8 cm. in diameter, almost hidden by the white cobwebby hairs of the areoles; ribs numerous, often 23, low; pseudocephalium on the west side of the plant, consisting of a mass of long white wool extending from the top of the branch downward sometimes for 5 to 6 dm.; spines yellow, the radials short, hidden in the white hairs, the central spines 2 or 3, porrect, acicular, 2 to 3 cm. long; flower opening at night, 4 cm. long; inner perianth-segments white, broad, short; stamens in 2 series; stamens in upper series with short filaments or none; stamens in lower series united at base into a short tube; style slender, cream-colored, 3.5 cm. long; stigma-lobes about 15, linear; fruit globular, naked, pinkish, 2.5 cm. in diameter; seeds black, roughened.

FIG. 30.—Cephalocereus dybowskii.

Type locality: Itumirin, Bahia, Brazil.

Distribution: Common on the dry hills in Bahia, where it forms dense thickets sometimes to the exclusion of all other plants.

Our description is based largely on the specimens collected by Dr. Rose at Barrinha, Bahia, in 1915 (No. 19785).

In Bahia this species is called cabeça branca or mandacaru de penacho.

Figure 30 is from a photograph taken at Barrinha, Bahia, by Paul G. Russell in 1915.

6. Cephalocereus macrocephalus Weber in Schumann, Gesamtb. Kakteen 197. 1897.

Pilocereus macrocephalus Weber, Dict. Hort. Bois 966. 1898.
Cereus macrocephalus Berger, Rep. Mo. Bot. Gard. 16: 62. 1905.

Plant of great size, 10 to 16 meters high, with a very solid woody trunk 3 to 6 dm. in diameter, simple or with a few ascending branches; pseudocephalium not so conspicuous as in *Cephalocereus senilis;* ribs numerous (about 24), low, obtuse, pale green; radial spines about 12, spreading; central spines several, sometimes 6 cm. long; flowering areoles spineless but bearing white, stiff hairs or weak bristles; perianth about 5 cm. long, the tube bearing a few distant scales, the limb short, the outer segments rounded.

Type locality: Tehuacán, Mexico.

Distribution: Southern Puebla, Mexico.

Dr. Rose found this species very common on a single hill near Tehuacán, forming a forest of considerable size. The individual plants are often very large and the trunk is so stout and woody that one can not cut down the plants readily, as is the case with *Cephalocereus senilis* and some other species of this genus.

Illustrations: Contr. U. S. Nat. Herb. 10: pl. 43, f. B; MacDougal, Bot. N. Amer. Des. pl. 15; Nat. Geogr. Mag. 21: 698; Möllers Deutsche Gärt. Zeit. 29: 351. f. 6.

Plate 1 is from a photograph taken by Dr. MacDougal near Tehuacán in 1906.

7. Cephalocereus pentaedrophorus (Labouret).

Cereus pentaedrophorus Labouret, Monogr. Cact. 365. 1853.
Pilocereus polyedrophorus Lemaire, Rev. Hort. 1862: 428. 1862.
Pilocereus pentaedrophorus Console in Schumann, Gesamtb. Kakteen 174. 1897.

Stems very slender, usually only 2 to 5 meters, rarely 7 or occasionally 10 meters high, 10 cm. in diameter or less, bluish, glaucous especially toward the growing tip; ribs usually 4 to 6, but occasionally as many as 8; areoles without wool, often large, separated by horizontal grooves or depressions; spines yellow, various as to size and number, usually 6 to 12, the longest often 4 cm. long; flowers 4 to 6 cm. long; perianth-tube bent near the middle; ovary and tube green, glabrous, rarely with a few minute scales; perianth-segments small, white; fruit depressed-globose, 3 cm. broad; pulp red, juicy.

FIG. 31.—Cephalocereus pentaedrophorus.

Type locality: Moro-Queimado, Bahia, Brazil.

Distribution: Very common in the brush country of Bahia, Brazil, but not found in dry parts of that state.

Labouret (Monogr. Cact. 365. 1853) gives *Cereus pentalophorus* Labouret and *Cereus pentagonus glaucus* Morel as synonyms.

Fig. 32.—Fruit of Cephalocereus pentaedrophorus. ×0 6.
Fig. 33.—Flower of same. ×0.6.

This species differs from its relatives in its smaller flowers and fruits, in the flower-tube being more or less curved or sometimes abruptly bent, and in the flowering areoles

never producing long hairs or wool. The plant, although widely distributed in Bahia, is not found in the dry parts where other cacti are common, but prefers the borders of the deserts, growing usually as solitary individuals surrounded by bushes and small trees. The stems, which are erect and usually unbranched, project about the surrounding vegetation. They are of a vivid glaucous-blue color and thus in striking contrast to their surroundings.

Plate IV, figure 1, shows the top of a flowering plant in the collection of the New York Botanical Garden. Figure 31 is from a photograph taken in Bahia by Paul G. Russell in 1915; figure 32 shows a fruit collected by Dr. Rose at Machado Portella, Brazil; figure 33 shows a flower.

8. Cephalocereus polylophus (De Candolle) Britton and Rose, Contr. U. S. Nat. Herb. **12**: 419. 1909.

Cereus polylophus De Candolle, Mém. Mus. Hist. Nat. Paris **17**: 115. 1828.
Pilocereus polylophus Salm-Dyck, Cact. Hort. Dyck. 1844. 24. 1845.

Erect, with simple stems 10 to 13 meters high, green; ribs 15 to 18; areoles small, 1 cm. apart or less, bearing white felt but no wool; spines 7 or 8, yellow, straight, spreading; central spine single, longer than the others; flowers 4 to 5 cm. long, about 3 cm. broad at top, narrowly funnelform; free part of tube 6 to 8 mm. long with ridges down the inside; stamens included, inserted on the throat; filaments about 5 mm. long, red; inner perianth-segments probably red, broad and short, rounded at apex; ovary somewhat tuberculate; scales small, without felt, wool, or hairs in their axils; scales of flower-tube small, acute, spreading, with the tip reflexed.

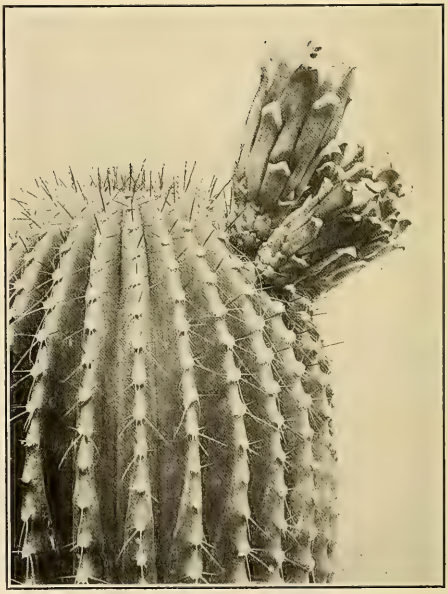

Fig. 34.—Cephalocereus polylophus.

Type locality: Mexico.

Distribution: Eastern Mexico.

In 1909 Dr. C. A. Purpus sent Dr. Rose a small plant labeled *Pilocereus polylophus* which is probably this species. It is now only about 30 cm. high and may be briefly described as follows: Ribs 14, strongly notched below the areoles; areoles white-felted; spines 3 to 6, at first brown, becoming white, acicular, about 1 cm. long.

The flower of this species is not typical for the genus. We have never seen it in bloom, but it did flower in the Missouri Botanical Garden, August 24, 1905, and our description is based on photographs, specimens, and notes made by Mr. C. H. Thompson at that time. The plant is known in trade also as *Cereus nickelsii* and is a shy bloomer in cultivation. The name occurs in the Monatsschrift für Kakteenkunde for 1910 (**20**: 27).

Cereus angulosus Stieber (Schumann, Gesamtb. Kakteen 175. 1897) belongs here.

Illustration: Bull. U. S. Dept. Agr. Bur. Pl. Industr. **262**: pl. 9, as *Pilocereus polylophus*.

Figure 34 is from a photograph of the plant in flower at the Missouri Botanical Garden in 1905, copied from Bulletin No. 262 of the Bureau of Plant Industry.

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M. E. Eaton del.

1. Flowering stem of *Cephalocereus pentædrophorus*.
2. Top of stem of *Cephalocereus gounellei*.
3. Top of stem of *Cephalocereus bahamensis*, with flower.
4. Fruit of *Cephalocereus deeringii*.

(All natural size.)

9. Cephalocereus euphorbioides (Haworth).

Cereus euphorbioides Haworth, Suppl. Pl. Succ. 75. 1819.
Cactus euphorbioides Sprengel, Syst. 2: 496. 1825.
Pilocereus euphorbioides Rümpler in Förster, Handb. Cact. ed. 2. 658. 1885.

Plant 3 to 5 meters high, columnar, usually simple; ribs 8, acute, somewhat crenate; areoles less than 1 cm. apart, white-felted; spines few, sometimes only 4 or 5, and then only 1 prominent, dark brown, porrect, about 1 cm. long; ovary 2 cm. long, spirally tuberculate; tubercles bearing triangular scales sparingly woolly in their axils, with 1 to 4 yellow spines; perianth-tube funnelform, campanulate, 4.5 cm. long; outer perianth-segments 15 mm. long, fleshy, reflexed, brown or reddish brown, the inner ones 2 cm. long, reflexed, rose-red; flowers diurnal.

Type locality: Not cited.

Distribution: The Index Kewensis says South America; Schumann says Brazil, not Mexico; Rümpler says Mexico and tropical America. Known to us only from cultivated specimens.

Rümpler refers here *Cereus conicus* Hort. Berol. (Pfeiffer, Enum. Cact. 97. 1837), which Pfeiffer states is from Mexico. *Cereus olfersii* Salm-Dyck (Hort. Dyck. 335. 1834) probably belongs here. The Theodosia B. Shepherd Company, in their Descriptive Catalogue for 1916, describes briefly *Cereus olfersii* from Brazil as follows: "A magnificent *Cereus*, exceedingly stout growth; color light blue; beautiful spines which are jet black and very long."

Cereus polylophus is very similar in its habit and flowers to this species. Although Haworth did not know its origin, it is usually stated to have come from Brazil. In habit it resembles *Cephalocereus fluminensis*.

Illustrations: Monatsschr. Kakteenk. 17: 89, as *Pilocereus euphorbioides;* Rev. Hort. 57: 279. f. 47, 48, as *Cereus olfersii*.

Fig. 35.—Cephalocereus euphorbioides.

Figure 35 is from a photograph of a plant in the New York Botanical Garden.

10. Cephalocereus russelianus (Otto) Rose, Stand. Cycl. Hort. Bailey 2: 715. 1914.

Cereus russelianus Otto in Salm Dyck, Cact. Hort. Dyck. 1849. 201. 1850.
Pilocereus russelianus Rümpler in Förster, Handb. Cact. ed. 2. 682. 1885.

Often tree-like, up to 8 meters high, with a much branched top and a definite woody trunk, 2 meters long and 2.5 dm. in diameter; branches elongated, nearly erect, dark green; ribs 4 to 6, stout, with prominent horizontal creases on the sides; areoles 1 to 2 cm. apart, large and circular, when young bearing white wool sometimes 1 to 1.5 cm. long; spines 8 to 14, at first dark brown but in age becoming gray except at the tips, 1 to 1.5 cm. long; flowers nocturnal, 7 to 9 cm. long, appearing from areoles anywhere on the branches or even from the base of the old trunk, cutting off after anthesis at the top of the ovary; top of unopened flower tuberculate; upper scales and outer perianth-segments broad, obtuse, thick, fleshy, pinkish; inner perianth-segments narrow, almost

Fig. 36.—Flower of Cephalocereus russelianus. ×0.7.
Fig. 37.—Fruit of same. ×0.7.

linear, cream-colored, erect; stamens numerous, included; ovary naked or nearly so, oblong, olive-green; fruit crowned by the persisting style, salmon-colored, about 6 cm. long, when fully mature splitting from top to bottom, exposing the white juicy pulp.

Type locality: La Guayra, Venezuela.

Distribution: Northern Venezuela and Colombia.

Collected by Dr. and Mrs. J. N. Rose in 1915, on the mountains between La Guayra and Carácas (No. 21828) and again near Puerto Cabello, Venezuela (No. 21859).

This species was also collected by William R. Maxon in April 1906, at Puerto Colombia, Colombia, and in June of the same year at the same place by H. Pittier, and by John G. Sinclair in 1914, at Santa Marta, Colombia. Mr. Maxon's plant was confused with *Cephalocereus colombianus*, based on material collected by Mr. Pittier from the State of Cauca.

Illustration: Möllers Deutsche Gärt. Zeit. **25**: 473. f. 5, No. 5, as *Pilocereus russelianus*.

Figure 38 is from a photograph taken by Mrs. J. N. Rose above Carácas, Venezuela, in 1916; figure 39 is from a photograph of the top of a plant collected by J. G. Sinclair at Santa Marta; figure 36 shows the flower of the Carácas plant and figure 37 its fruit.

FIG. 38.—Cephalocereus russelianus.

FIG. 39.—Cephalocereus russelianus.

11. Cephalocereus gounellei (Weber).

Pilocereus gounellei Weber in Schumann, Gesamtb. Kakteen 188. 1897.
Cereus setosus Gürke in Ule, Monatsschr. Kakteenk. **18**: 19. 1908. Not Loddiges. 1832.
Pilocereus setosus Gürke, Monatsschr. Kakteenk. **18**: 52. 1908.

Low, 1 to 2 or rarely 3 meters high, much branched and spreading to as much as 5 meters in diameter, often with a definite woody trunk up to 12 cm. in diameter; lower branches at first spreading or creeping, the tips ascending or even erect, pointed, the upper branches horizontal; ribs 10 or 11, stout, acute, more or less tuberculate; areoles large, 1.5 cm. in diameter; flowering areoles with many long white hairs covering the flower-buds; radial spines 15 to 24, widely spreading, brown; central spines 4 to 6, subulate, much stronger than the radials, sometimes 10 cm. long; perianth tubular to funnelform, white, 7 to 9 cm. long, glabrous, the limb shorter than the tube; stigma-lobes 15 to 18; ovary glabrous; fruit purplish, depressed-globose.

Type locality: Certão, Pernambuco, Brazil.

Distribution: Semi-arid parts of Pernambuco and Bahia, Brazil.

This species is very common in the dry parts of Bahia and Pernambuco, where it is known as chique-chique. The town Chique Chique on the São Francisco River takes its name from this plant. Several collections of this plant were made by Dr. Rose in Bahia in 1915 (Nos. 19945, 19846, and 19289).

FIG. 40.—Cephalocereus gounellei.

The perianth is relatively longer and narrower than that of other species of this genus.

Illustrations: Monatsschr. Kakteenk. 18: 21, as *Cereus setosus;* Vegetationsbilder 6: pl. 15, as *Pilocereus setosus.*

Plate IV, figure 2, shows the top of a plant collected by Dr. Rose near Joazeiro, Bahia, in 1915. Figure 40 is a nearby view of a good-sized plant taken by P. H. Dorsett in northern Bahia, Brazil, in 1914.

12. Cephalocereus zehntneri sp. nov.

Low, much branched, and spreading; branches 3 to 4 cm. in diameter, about 9-ribbed, more or less tubercled; areoles 1 to 2 cm. apart, long-hairy when young; spines often 30 or more, only slightly spreading, all acicular and bright yellow, the centrals similar to the radials or a little longer, the longer ones 3 to 4 cm. long; flowering areoles producing with the flowers long tufts of white wool; flowers slender, tubular, 6 to 7 cm. long, white to light cream-colored; inner perianth-segments oblong, obtuse; style slender, glabrous, cone-shaped at base; ovary naked.

FIG. 41.—Flower of C. zehntneri. ×0.6.

Collected by Leo Zehntner, from the Serra de Tiririca, Bahia, Brazil, November 1917. It is called chique-chique das pedras and is similar in habit to the one from Joazeiro described above. Dr. Zehntner says, however, that it prefers a rocky habitat while the common chique-chique is found on sandy ground and this statement is in accordance with Dr.

Rose's observations. Dr. Zehntner also says it differs from the latter in its more numerous, finer spines, which are of a light orange-yellow color. We find, too, that the radial spines are less spreading, while the centrals are much like the radials, acicular, and not stout-subulate as in the other species, and the flowers appear to be smaller.

Figure 41 shows a flower from the type plant.

13. Cephalocereus leucostele (Gürke).

Cereus leucostele Gürke, Monatsschr. Kakteenk. **18**: 53. 1908.

Plants normally simple, 2 to 5 meters tall, 4 to 8 cm. in diameter, the joints surrounded by peculiar bands or collars of long bristles; ribs 13 to 18, low; spines numerous, white, acicular, the lateral ones spreading, the central much longer, 3 to 5 cm. long; flowers borne in a mass of wool at top of plant but fruit becoming lateral by the prolongation of the stem; perianth slightly curved

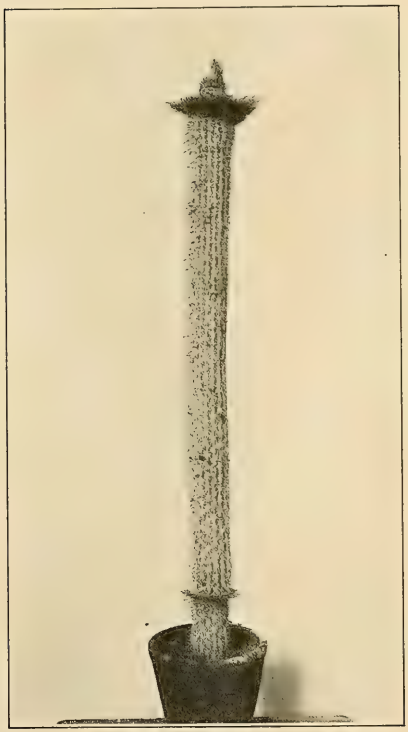


FIG. 42.—Cephalocereus leucostele.

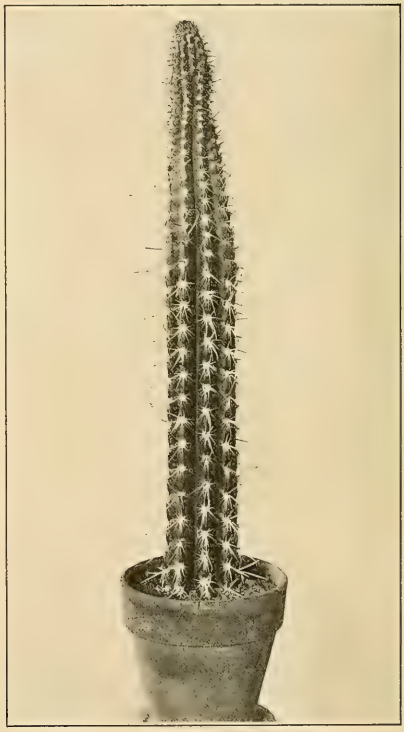


FIG. 43.—Cephalocereus smithianus.

downward, dull green, with a few small scales, 7 cm. long, opening in the early evening; perianth-segments short, waxy, white, tightly recurved; stamens numerous, included; filaments white, the upper cluster thickly set all over the long throat, very short; the lower cluster few, fixed at top of short tube proper, longer than the others, bent in just above their bases forming a knee and pressing against the style; space between the two clusters of stamens short but definite; perianth-tube proper 1.5 cm. long; style slender, white, pressed against the upper part of tube; anthers dehiscing soon after the flower expands, appressed against the tube; fruit smooth, longer than broad, 5 cm. long, bluish green, the rind thick, the pulp white; seeds black, tuberculate.

Type locality: Calderão, Bahia.

Distribution: Deserts of southern Bahia, Brazil.

A cutting, received from the Berlin Botanical Garden with the name *Cereus albispinus* Salm-Dyck, is strikingly similar to *Cephalocereus leucostele*.

In developing, the perianth carries flecks of wool with it from the dense white cushion at the areole; the perianth-tube bears several distant scales passing into the numerous outer, green, obtuse segments; inner perianth-segments about 25, ovate, white, acute, firm in texture, reflexed-spreading, about 12 mm. long; stigma-lobes pale yellow, slightly exserted when the perianth is fully expanded; stamens unequal in length. Dr. Rose collected living and herbarium specimens in Bahia in 1915 (No. 19902).

Illustration: Bot. Jahrb. Engler **40**: Beibl. **93**: pl. 5, as *Cereus leucostele*.

Figure 42 is from a photograph of a plant brought to the New York Botanical Garden from Machado Portella, Bahia, by Dr. Rose in 1915; figure 44 shows a flower of this plant and figure 45 its fruit.

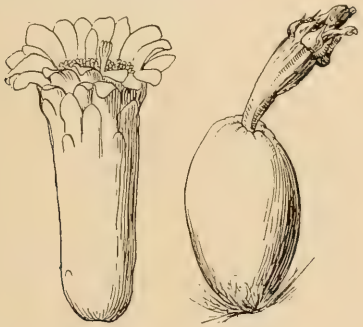


FIG. 44.—Flower of Cephalocereus leucostele. ×0.7.
FIG. 45.—Fruit of same. ×0.7.

FIG. 46.—Flower of C. smithianus. ×0.7.
FIG. 47.—Fruit of same. ×0.7.

14. Cephalocereus smithianus sp. nov.

Stems weak and slender, 4 to 7 cm. in diameter, simple or much branched, erect or more or less clambering; ribs 9 to 11, low and rounded, sometimes constricted between the areoles; areoles rather large, felted; radial spines short, white, acicular, 1 cm. long or less; central spines several, nearly porrect, the longest ones 3 to 4 cm. long, at first black, in age black only at tips; flower 6 to 8 cm. long, 4 cm. broad across the mouth, with a short funnelform tube bearing a few broad ovate scales with reddish tips; inner perianth-segments short, rounded, white; ovary with a few minute scales; fruit ovoid, 3 to 4 cm. in diameter, red, splitting on one side when mature; areoles on the fruit each represented by a horizontal line 8 mm. long, subtended by a minute brown scale; pulp white; seeds black.

Collected by Dr. and Mrs. J. N. Rose just below Zig Zag, between La Guayra and Carácas, Venezuela, October 25, 1916 (No. 21889, type) and by Dr. Rose and Major C. C. Smith near Puerto Cabello, Venezuela, October 28 (No. 21852); also by Dr. Britton, Mr. W. G. Freeman, and Professor T. E. Hazen on Patos Island, Trinidad, a few miles from the Venezuelan Coast, March 13, 1920 (No. 532).

In form its flower is not quite typical of the genus.

This species is named for Major Cornelius C. Smith, U. S. Army, who accompanied and assisted Dr. Rose during some of his excursions in northern Venezuela in 1916.

Figure 43 is from a photograph of a plant brought by Dr. Rose to the New York Botanical Garden from Puerto Cabello, Venezuela, in 1916; figure 46 shows the flower and figure 47 the fruit, collected by Dr. Rose between Carácas and La Guayra.

15. Cephalocereus bahamensis Britton, Contr. U. S. Nat. Herb. **12**: 415. 1909.

Cereus bahamensis Vaupel, Monatsschr. Kakteenk. **23**: 23. 1913.

Plant 3 to 4 meters high, often 20 cm. thick at the base; branches divergent-ascending, 7 to 9 cm. thick, dull green, not pruinose, 10 or 11-ribbed, the ribs blunt or acutish, rather higher than wide; areoles 1 to 1.5 cm. apart; spines 15 to 20, acicular, radiately spreading and ascending, grayish brown to yellowish brown when old, 1 to 1.5 cm. long, the young ones yellowish with darker bases, the uppermost 2.5 to 3 cm. long; wool very short, shorter than the spines, or none; flower 5 to 6 cm. long, brownish outside, the tube bluish; inner perianth-segments creamy white, tinged with pink, acute; style pale greenish white, sometimes slightly exserted; fruit depressed-globose, 3 to 4 cm. in diameter.

Type locality: Frozen Cay, Berry Islands, Bahamas.

Distribution: Bahamas.

Illustration: Journ. N. Y. Bot. Gard. **11**: f. 20.

Plate IV, figure 3, shows a cutting of the type plant which flowered in the New York Botanical Garden July 24, 1912. Figure 48 is from a photograph of the type plant in flower; figure 49 is from a photograph taken by Dr. Paul Bartsch on Andros Island.

FIG. 48.—Cephalocereus bahamensis.

FIG. 49.—Cephalocereus bahamensis.

16. Cephalocereus deeringii Small, Journ. N. Y. Bot. Gard. **18**: 201. 1917.

Plant slender, often becoming 10 meters tall, the stem erect, simple or with few erect, short or elongated fastigiate branches which are ascending or erect and appressed to the main stem, the branches deep green, but sometimes rather light, usually 10-ribbed, sometimes 9-ribbed; areoles copiously short-hairy, the hairs rather persistent; spines acicular, 25 to 31 together, the longer ones 1 cm. long or more; flowers opening in the afternoon, about 6 cm. long, elongate-campanulate, light green without; outer perianth-segments obovate, obtuse, rounded, or emarginate; inner perianth-segments 9 to 11 mm. long, clawless, oval, rounded at the apex, erose, scarcely narrowed at the base; anthers less than 2 mm. long; fruit much depressed, 3.5 to 4 cm. in diameter, dark red; seeds about 2 mm. long, shining.

A clump of plants of *Cephalocereus deeringii* on Lower Matacumbe Key, Florida.

Type locality: Lower Matecumbe Key, Florida.

Distribution: Rocky hammocks, Lower Matecumbe Key, Florida.

The plant was named for Charles Deering, whose deep interest in the botanical exploration of Florida and in the preservation of its hammocks from destruction and its rare native plants from extermination, enabled Dr. Small to rediscover, study, and satisfactorily determine the relationship of this plant.

Plants similar to those from Upper and Lower Matecumbe Key have been collected on Umbrella Key, which is a few miles north of Lower Matecumbe, and these plants represent, without much doubt, the same species.

Illustration: Journ. N. Y. Bot. Gard. **18**: pl. 206.

Plate IV, figure 4, shows a fruit from the type plant; plate V is from a photograph of the type colony of plants on Lower Matecumbe Key, taken by Dr. Small in May 1917. Figure 50 shows the flower and figure 51 the fruit with withering persistent corolla.

FIG. 50.—Flower of C. deeringii. ×0.7.
FIG. 51.—Fruit of same. ×0.7.

17. Cephalocereus robinii (Lemaire).

Pilocereus robinii Lemaire, Illustr. Hort. **11**: Misc. 74. 1864.
Cephalocereus bakeri Britton and Rose, Contr. U. S. Nat. Herb. **12**: 415. 1909.
Cereus bakeri Vaupel, Monatsschr. Kakteenk. **23**: 23. 1913.

Plant 3 to 8 meters high, branching near and above the base; branches ascending, 7 to 10 cm. thick, dull green, bright glaucous green when young; ribs 10 to 13, acutish; areoles 1 to 1.5 cm. apart, bearing short wool; spines 15 to 20, acicular, 1 to 2.5 cm. long, yellow when young, becoming gray, the centrals hardly different from the radials; flowering areoles close together; flowers brownish green, 5 cm. long, 3 cm. broad at widest part of throat, constricted at top of tube proper, alliaceous in odor; tube green and slightly glaucous; ovary and lower part of tube with a few small scales; upper scales broadly ovate with bluish purple tips passing into greenish or cream-colored perianth-segments, the inner segments white; tube proper very short (1 cm. long or less); throat 2.5 cm. long, bearing stamens all over its surface; stamens white,

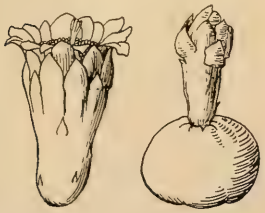


FIG. 52.—Flower of C. robinii. ×0.7.
FIG. 53.—Fruit of same. ×0.7.

FIG. 54.—Cephalocereus robinii.

included, the inner row appressed against the style; style creamy white, 6 cm. long, exserted beyond the perianth-segments; fruit 4 cm. in diameter, flattened above, dark wine-colored; seeds smooth, black, shining.

Type locality: Near Habana, Cuba.

Distribution: Coastal regions of Matanzas and Habana, Cuba.

This species was recorded by Grisebach as *Cereus royenii armatus*.

Illustrations: Journ. N. Y. Bot. Gard. **11**: 226, f. 28; Roig, Cact. Fl. Cub. pl. [3], f. 1, as *Cephalocereus bakeri*.

Figure 52 shows a flower of *Cephalocereus robinii*, and figure 53 its fruit; figure 54 is from a photograph of the plant obtained by Brother Léon at the type locality.

18. Cephalocereus keyensis Britton and Rose, Contr. U. S. Nat. Herb. **12**: 416. 1909.

Cereus keyensis Vaupel, Monatsschr. Kakteenk. **23**: 23. 1913.

Plant 5 to 6 meters high, little branched, the branches almost erect, 5 to 6 cm. in diameter, the trunk up to 12 cm. thick; ribs 9 or 10, narrow, separated by deep grooves, bluish green, very glaucous; areoles 1 to 2 cm. apart, slightly elevated; spines about 15, acicular, yellow, diverging, 1.5 cm. long or less; wool very short, less than 1 mm. long, white, turning grayish; flowers brownish purple, narrowly campanulate, 6 cm. long, with a strong odor of garlic when opening in the late afternoon or evening, odorless the next morning; outer perianth-segments oblong-spatulate, bluntly pointed, the inner acutish; style scarcely exserted; fruit depressed-globose, reddish, 3.5 cm. thick, about 2 cm. high.

FIG. 55.—Cephalocereus keyensis.

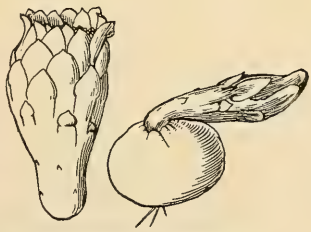


FIG. 56.—Flower of C. keyensis. ×0.7.
FIG. 57.—Fruit of same. ×0.7.

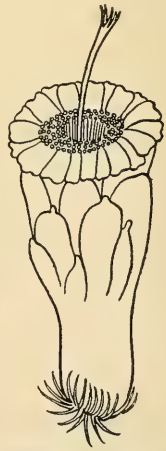


FIG. 58.—Flower of Cephalocereus monoclonos.

Type locality: Hammock, Key West, Florida.

Distribution: Key West, Big Pine Key, and Boca Chica Key.

The plant is now very nearly exterminated on Key West, owing to the necessity for military purposes during the war with Germany of clearing the hammock in which it grew. Dr. Small succeeded in establishing it in flourishing masses in the cactus garden of Mr. Charles Deering at Buena Vista, Miami, Florida.

Illustration: Journ. N. Y. Bot. Gard. **10**: f. 25.

Figure 55 is from a photograph of the type plant taken by Marshall A. Howe; figure 56 shows its flower and figure 57 its fruit.

19. Cephalocereus monoclonos (De Candolle) Britton and Rose, Contr. U.S. Nat. Herb. **12**: 418. 1909.

Cereus monoclonos De Candolle, Prodr. **3**: 464. 1828.
Melocactus monoclonos Steudel, Nom. ed. 2. **2**: 122. 1841.

Stems simple, erect, tall, mostly 8-ribbed; ribs triangular in section, high, obtuse; spines 10 to 16, short, about equal, spreading; flowering areoles with only a few short hairs; flower-tube short and thick, bearing a few broad, pointed scales; perianth-segments white, numerous, spreading, retuse; stamens not exserted, numerous; style slender, long-exserted, with 5 or 6 stigma-lobes; fruit purple, globular, naked, thick-walled, with numerous shining seeds.

Type locality: Caribbean Islands, according to De Candolle.

Distribution: Probably Hispaniola.

There are probably two species of this genus on Hispaniola, although a half-dozen species have been described, two of them based on the same illustration. We believe that *C. monoclonos* is one of these. De Candolle, however, who first took up this species under *Cereus*, and who knew it only from Plumier's description and his somewhat conventionalized plate, gave its range as Caribbean Islands, but since most of Plumier's plates are supposed to be based on Hispaniola plants, it should be looked for on that island; however, explorations on both sides of the island in recent years have failed to bring it to light.

Illustration: Plumier, Pl. Amer. ed. Burmann, pl. 191.

Figure 58 is copied from Plumier's plate above cited.

20. Cephalocereus scoparius (Poselger) Britton and Rose, Contr. U. S. Nat. Herb. **12**: 419. 1909.

Pilocereus scoparius Poselger, Allg. Gartenz. **21**: 126. 1853.
Cereus scoparius Berger, Rep. Mo. Bot. Gard. **16**: 63. 1905.

"Arborescent; much branched, 20 to 25 feet high. Trunk a foot and more in diameter. Branches often very long, 2 to 3 inches in diameter. The younger branches, which have not yet borne flowers, are somewhat different from the older ones which have borne flowers. The former (younger) have 12 to 15 ribs. Ribs blunt, the furrows tolerably sharp. Areoles 8 to 12 lines apart, naked, somewhat thickened and protruding, close under the areole a strongly marked horizontal impression, through which the ribs appear serrated. Radial spines 5, somewhat bent downward, 2½ to 4 lines long. Central spine 1, stout, sharp, bent upward, blackish when young, later whitish, 1 inch long. The latter (older) flower-bearing branches are usually thinner, having 20 to 25 ribs; these are lower, blunter, and much closer together. Areoles very thick. Radial spines 5 to 7, central spine 1, all of the spines 10 to 15 lines long, bristle-like, brown. Flowers very sparse, small, almost campanulate (bell-shaped) reddish. Fruit red, of the size of a hazel-nut. Seeds large, black, shiny." This is a translation of the original description.

Type locality: Near La Soledad (near Vera Cruz, Mexico).

Distribution: Known only from the type locality.

Pilocereus sterkmannii Hortus is an unpublished name cited in the synonymy of *P. scoparius* by Schumann (Gesamtb. Kakteen 179. 1897).

We know the plant only from description. Schumann (Gesamtb. Kakteen 179) states that the flowering tops have up to 25 ribs.

21. Cephalocereus moritzianus (Otto).

Cereus moritzianus Otto in Pfeiffer, Enum. Cact. 84. 1837.
Pilocereus moritzianus Lemaire, Illustr. Hort. **13**: under pl. 469. 1866.

Tree-like, up to 10 meters high, sometimes with 50 ascending branches, green or bluish; ribs 7 to 10, obtuse, separated by acute intervals; areoles 10 to 12 mm. apart, all white-woolly at first; flowering areoles with tufts of wool 1 cm. long or longer; spines slender, at first brownish, rigid, straight, 1 to 3.5 cm. long; radial spines 6 to 8; central spines 3; flowers 5 cm. long, the outer perianth-segments broad, short, the inner white, obtuse; fruit red, depressed, naked, 4 to 5 cm. broad.

Type locality: La Guayra, Venezuela.

Distribution: Venezuela; northwestern mainland and Bocas Islands of Trinidad; Tobago.

This species is common above La Guayra and about Puerto Cabello, Venezuela, especially about the latter place, where it is the most common cactus seen, being abundant both on the hills and on the flats near the sea. Its branches are often overrun by orchids, vines, and bromeliads.

It is abundant on Monos, Chacachacare, and Patos Islands of Trinidad, inhabiting rocky hillsides and cliffs, and varying from slender, light green, and simple-stemmed in sunny situations to stout, dark green, and much branched in woodlands.

Cereus pfeifferi Parmentier (Pfeiffer, Allg. Gartenz. 5: 370. 1837) is referred to the synonymy of *Cereus moritzianus* by Labouret (Monogr. Cact. 344. 1853), who also states on the same page that in Monville's Catalogue is indicated the variety *C. moritzianus pfeifferi*. As *Cereus pfeifferi* is supposed to have originally come from Buenos Aires, it is more likely to be a true *Cereus*.

FIG. 59.—Flower of Cephalocereus moritzianus.
FIG. 60.—Fruit of same. Both ×0.7.

FIG. 61.—Cephalocereus moritzianus.

Figure 61 is from a photograph taken by Mrs. J. N. Rose near Puerto Cabello, Venezuela, in 1916; figure 59 shows the flower of this plant; figure 60 a fruit of same.

22. Cephalocereus arrabidae (Lemaire).

Pilocereus arrabidae Lemaire, Rev. Hort. **1862**: 429. 1862.
Cereus warmingii Schumann in Martius, Fl. Bras. 4^2: 204. 1890.
Pilocereus exerens Schumann in Engler and Prantl, Pflanzenfam. 3^{6a}: 181. 1894.
Cephalocereus exerens Rose, Stand. Cycl. Hort. Bailey **2**: 715. 1914.

Rather low but sometimes 3 meters high, often much branched at base, usually pale, somewhat glaucous; branches 6 to 10 cm. in diameter; ribs 6 to 8, high, obtuse; areoles rather close together, producing long hairs when young, but no tufts of hairs or wool at flowering time; spines 5 to 10, acicular to subulate, unequal, the longest up to 4 cm. long, brownish or sometimes yellowish; flowers 6 cm. long; inner perianth-segments white; fruit depressed, 6 cm. broad; seeds black, shining.

Type locality: Not cited.
Distribution: Along the sandy coast of Brazil.

The synonymy of this coastal species of Brazil is very complicated, for it has been confused with a Mexican species of uncertain relationship. An attempt is here made to account for the various names. Schumann took up the specific name *exerens* for it, basing it on *Cereus exerens*, an unpublished name of Link. *Pilocereus arrabidae* Lemaire seems to be the oldest definite name for the plant. This is not to be confused with *Cereus arrabidae* (Steudel, Nom. ed. 2. **1**: 333. 1840) as it has been in the Index Kewensis.

M. E. Eaton del.

1 Top of flowering stem of *Cephalocereus arrabidae.*
2. Top of flowering stem of *Cephalocereus nobilis.*
3. Top of flowering stem of *Cephalocereus barbadensis.*
(Natural size.)

Schumann refers here *Cereus virens* Pfeiffer (Enum. Cact. 99. 1837; *Pilocereus virens* Lemaire, Illustr. Hort. 13: Misc. 20. 1866), but Pfeiffer really did not propose a new name, although the plant he described may have been different from De Candolle's (Mém. Mus. Hist. Nat. Paris 17: 116. 1828), which came from Mexico, for the latter is definitely stated to have been sent by T. Coulter from there, and is described as a simple, light green, 5-ribbed plant; it may be a *Lemaireocereus*. Schumann refers *Cereus sublanatus* Salm-Dyck (Hort. Dyck. 337. 1834) here, but this reference is to be questioned. If the two are the same the name *sublanatus* must be taken up instead of *arrabidae*.

Cereus exerens Link (Pfeiffer, Enum. Cact. 99. 1837) was never described but given as a synonym of *Cereus virens*. *Cereus retroflexus* Pfeiffer (Allg. Gartenz. 3: 380. 1835) and *C. reflexus* Steudel (Nom. ed. 2. 1: 335. 1840) were given as synonyms of *C. tilophorus*. *Cereus ericomus*, given as a synonym of *Pilocereus exerens*, was given by Salm-Dyck (Cact. Hort. Dyck. 1849. 47. 1850) as a synonym of *C. virens*.

Illustrations: Schumann, Gesamtb. Kakteen f. 39, as *Pilocereus exerens;* Monatsschr. Kakteenk. 2: 41, as *Pilocereus virens;* Martius, Fl. Bras, 4[2]: pl. 40, as *Cereus macrogonus;* Vellozo, Fl. Flum. 5: pl. 18, as *Cactus hexagonus;* also pl. 19, as *Cactus heptagonus*.

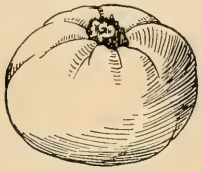


FIG. 62.—Fruit of Cephalocereus arrabidae. ×0.7.

FIG. 63.—Cephalocereus arrabidae.

Plate VI, figure 1, shows a flowering joint of a plant brought by Dr. Rose to the New York Botanical Garden from Iguaba Grande, Brazil, in 1915. Figure 62 shows the fruit collected by Dr. Rose at Bahia in the same year; figure 63 is from a photograph taken by Paul G. Russell on Juparyba Island, Bay of Rio de Janeiro, Brazil, in the same year.

23. Cephalocereus urbanianus (Schumann) Britton and Rose, Contr. U. S. Nat. Herb. 12: 420. 1909.

Pilocereus urbanianus Schumann, Gesamtb. Kakteen 193. 1897.
Cereus urbanianus Berger, Rep. Mo. Bot. Gard. 16: 63. 1905. Not Gürke and Weingart. 1904.

Simple and columnar or branching at base, sometimes 4 meters high, 3 cm. in diameter; branches 4 to 5 cm. in diameter, woolly at apex; ribs 8 to 12, obtuse; spines 10 to 13, spreading, stiff but flexuous; central spines distinct from the radials; flowers on one side of the stem, the flowering areoles bearing long brown wool and bristle-like spines often 4 to 6 cm. long; flower 3 to 4 cm. long; ovary bearing small scales; fruit depressed, 3 cm. broad; seeds black, smooth, shining.

Type locality: Guadeloupe Island, West Indies.

Distribution: Guadeloupe, Martinique, and, apparently, Grenada.

We have not seen this species alive; it is based upon Père Duss's No. 3506, of which material is preserved in the herbaria of the New York Botanical Garden and the United States National Museum. Specimens from Woodlands, St. George's, Grenada (W. E. Broadway, No. 1766) appear to be referable to this species.

24. **Cephalocereus nobilis** (Haworth) Britton and Rose, Contr. U. S. Nat. Herb. **12**: 418. 1909.

Cereus nobilis Haworth, Syn. Pl. Succ. 179. 1812.
Cactus strictus Willdenow, Enum. Suppl. 32. 1813. Not *C. strictus* Haworth, 1803.
Cactus haworthii Sprengel, Syst. **2**: 495. 1825.
Cactus niger Salm-Dyck in Sprengel, Syst. **2**: 495. 1825.
Cereus strictus De Candolle, Prodr. **3**: 465. 1828.
Cereus haworthii De Candolle, Prodr. **3**: 465. 1828.
Cereus aureus Salm-Dyck in De Candolle, Prodr. **3**: 465. 1828.
Cereus curtisii Otto in Pfeiffer, Enum. Cact. 81. 1837.
Cereus lutescens Salm-Dyck in Pfeiffer, Enum. Cact. 84. 1837.
Cereus violaceus Lemaire, Cact. Gen. Nov. Sp. 57. 1839.
Cereus nigricans Lemaire, Cact. Gen. Nov. Sp. 57. 1839.
Pilocereus curtisii Salm-Dyck, Cact. Hort. Dyck. 1844. 24. 1845.
Pilocereus consolei Lemaire, Rev. Hort. **1862**: 427. 1862.
Pilocereus haworthii Console in Lemaire, Rev. Hort. **1862**: 428. 1862.
Pilocereus nigricans Sencke in Lemaire, Illustr. Hort. **13**: Misc. 20. 1866.
Pilocereus lutescens Rümpler in Förster, Handb. Cact. ed. 2. 675. 1885.
Pilocereus strictus Rümpler in Förster, Handb. Cact. ed. 2. 687. 1885.
Pilocereus nobilis Schumann in Engler and Prantl, Pflanzenfam. 3[6a]. 181. 1894.
Pilocereus strictus consolei Schumann, Gesamtb. Kakteen 190. 1897.

Plant much branched and spreading, the ultimate branches slender, erect, green, shining when young, not at all glaucous, 8 to 10-ribbed; areoles about 1 cm. apart, at first producing only a little wool and this appressed against the ribs, but wool in flowering areoles very dense but short, white; spines up to 3.5 cm. long, acicular, at first yellow, soon brown; flower-buds obtuse or nearly truncate; flowers 4 to 6 cm. long; upper scales and outer perianth-segments broad, rounded at apex; inner perianth-segments purple; style exserted; fruit depressed-globose.

Type locality: West Indies.

Distribution: St. Christopher to Grenada.

The plant has escaped from cultivation on the island of St. Thomas, and has been grown at Hope Gardens, Jamaica.

As to the locality for *C. curtisii*, Pfeiffer (Enum. Cact. 81. 1837) gives Grenada, following Hooker, who originally published it as from Grenada, while Pfeiffer and Otto (Abbild. Beschr. Cact. **1**: pl. 11) give New Granada also as its original habitat.

Cereus aureus pallidior Salm-Dyck (Hort. Dyck. 63. 1834), given by name only, is referred by Pfeiffer (Enum. Cact. 84. 1837) as a synonym of *C. lutescens* Salm-Dyck.

Cereus mollis and *C. nigricans* (Pfeiffer, Enum. Cact. 83. 1837) and *C. mollis nigricans* (Labouret, Monogr. Cact. 349. 1853) were given as synonyms of *Cereus strictus*. *C. niger** Salm-Dyck (Observ. Bot. **3**: 4. 1822) and *C. niger gracilior* Salm-Dyck (Hort. Dyck. 63. 1834) may also belong here. *Cereus trichacanthus* (Salm-Dyck, Cact. Hort. Dyck. 1849. 46. 1850) was given as a synonym of *Cereus lutescens* and *Pilocereus trichacanthus* (Rümpler in Förster, Handb. Cact. ed. 2. 675. 1885) of *Pilocereus lutescens*. Here also, *Echinocereus trichacanthus*, only a name, is referred by the Index Kewensis.

Illustrations: Rep. Mo. Bot. Gard. **16**: pl. 4, f. 2, as *Cereus strictus;* Pfeiffer and Otto, Abbild. Beschr. Cact. **1**: pl. 11, as *Cereus curtisii;* Curtis's Bot. Mag. **59**: pl. 3125, as *Cereus royeni;* Krook, Handb. Cact. 92, as *Pilocereus*.

Plate VI, figure 2, shows a flowering branch of a plant in the collection of the New York Botanical Garden. Figure 64 is from a photograph of the plant growing on St. Thomas, taken by W. R. Fitch in 1913.

25. **Cephalocereus barbadensis** sp. nov.

Plant light green, tall, 3 to 6 meters high, with ascending or spreading columnar branches; ribs usually 8 or 9, high, separated by acute intervals; areoles 1 cm. apart; spines acicular, 1 to 4 cm.

* *Pilocereus niger* is different from *Cactus niger* Salm-Dyck and is not a synonym of *Cereus nobilis*, although it was referred to *P. strictus* by Schumann (Gesamtb. Kakteen 189. 1897). Neumann described *Pilocereus niger* (Rev. Hort. II. **4**: 289. 1845), a new species based on plants sent from Mexico by M. Ocampo. This species in the Index Kewensis and also in Schumann's Monograph is attributed to Poiteau, one of the editors of the Revue, but the article is signed by Neumann and, therefore, he should be made the author for the name. The Index Kewensis also makes it a synonym of *Cereus niger*, which it is not, nor should it be referred to this plant as it is by Schumann.

long, numerous, light brown; flowering areoles confined to one side of the branch and near its top; sometimes only on 3 ribs, producing abundant, long, white wool; flowers 5 to 6 cm. long; tube short and thick, greenish below, red above; perianth-segments numerous, light pink, spreading, obtuse; stamens scarcely exserted, dull yellowish white; style included; fruit red, subglobose, 3.5 cm. in diameter; seeds minute, shining, black.

Collected by J. N. Rose in company with W. Nowell, of the Imperial Department of Agriculture for the West Indies, on Barbados, September 30, 1915 (No. 21181). This species is found only on the exposed hills near the ocean on the eastern side of the island.

Plate VI, figure 3, shows the top of the type specimen in the New York Botanical Garden in flower in 1916. Figure 65 is from a photograph of the same plant; figure 66 is from a photograph taken near Boscobel, St. Andrew, February 9, 1919, communicated by Sir Francis Watts.

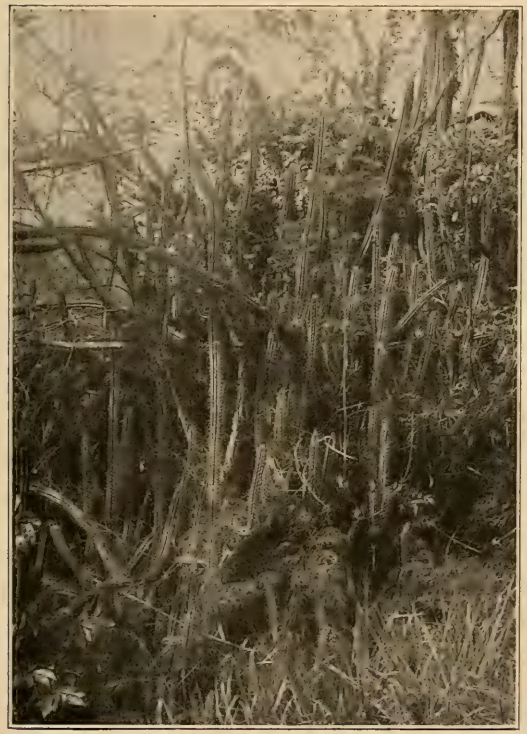


FIG. 64.—Cephalocereus nobilis.

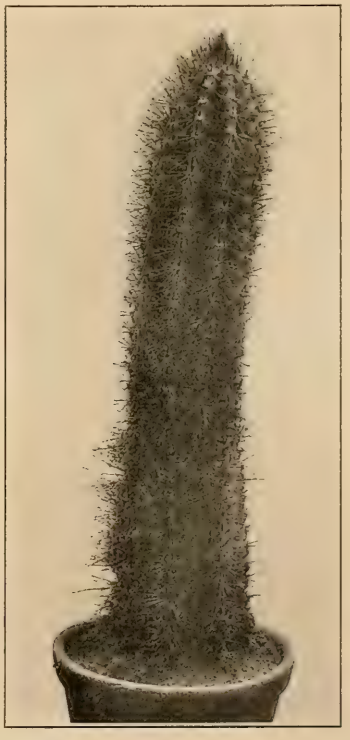


FIG. 65.—Cephalocereus barbadensis.

26. Cephalocereus millspaughii Britton, Contr. U. S. Nat. Herb. **12**: 417. 1909.

Cereus millspaughii Vaupel, Monatsschr. Kakteenk. **23**: 23. 1913.

Stem branched, 2 to 6 meters high, 20 cm. thick at the base, the branches nearly erect, 8 to 12 cm. thick, pale grayish green, pruinose, 8 to 13-ribbed; ribs acutish, about as wide as high or a little wider; areoles 1 to 2 cm. apart; spines about 20, acicular, widely radiating, 1 to 2 cm. long, or at the flower-bearing (upper) areoles 3 to 7 cm. long, the old ones gray-brown, the young ones

yellow or yellowish brown, with darker bases; upper areoles on one side of the plant with large tufts of whitish wool 5 to 7 cm. long, often as long as the spines or longer; flowers greenish, 6 to 7 cm. long; tube obconic with a spreading limb, 6 to 7 cm. broad, slightly purple, a little glaucous; scales on ovary and flower-tube few, small, acute; inner perianth-segments waxy, rigid, white, 1.5 to 2 cm. long; style white; fruit depressed-globose, about two-thirds as long as thick, about 4 cm. in diameter.

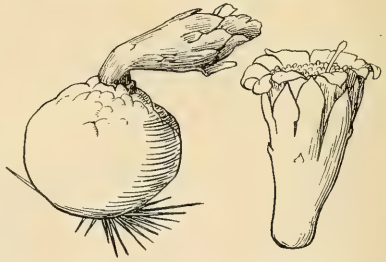
FIG. 66.—Cephalocereus barbadensis.

FIG. 67.—Cephalocereus millspaughii.

Type locality: Cave Cay, Exuma Chain, Bahamas.

Distribution: Bahamas; Cays of northern Cuba.

Figure 67 is from a photograph, taken by Marshall A. Howe in 1907 on the island Mariguana, Bahamas; figure 68 represents the fruit of the type specimen.



68 69

FIG. 68.—Fruit of Cephalocereus millspaughii. ×0.7.
FIG. 69.—Flower of Cephalocereus royenii. ×0.7.

27. Cephalocereus swartzii (Grisebach) Britton and Rose, Contr. U. S. Nat. Herb. **12**: 420. 1909.

Cereus swartzii Grisebach, Fl. Brit. W. Ind. 301. 1860.

Tall, 2 to 7 meters high, often simple; branches obtuse at apex; ribs 10, obtuse, strongly indented between the areoles; spines 8 to 10, or in young plants 20 or more from an areole, the longer ones 2.5 cm. long, slightly spreading; flowers pinkish to greenish yellow, sometimes borne on all the ribs, usually near the tops of the branches, surrounded with masses of white hair and long bristles; perianth 5 to 6 cm. long, the inner perianth-segments obtuse; fruit depressed-globose, 3 cm. in diameter, perhaps larger.

Type locality: Jamaica.

Distribution: Southern side of Jamaica.

Cephalocereus swartzii, which is confined to the dry southern portions of Jamaica, has frequently been confused with *Lemaireocereus hystrix*, which is very commonly used as a hedge plant along the country roads about Kingston.

Schumann (Gesamtb. Kakteen 184. 1897) by mistake attributed the name *Pilocereus swartzii* to Grisebach.

Figure 70 is from a photograph obtained by Wm. Harris near Port Henderson, Jamaica.

28. Cephalocereus polygonus (Lamarck) Britton and Rose, Contr. U. S. Nat. Herb. **12**: 418. 1909.

Cactus polygonus Lamarck, Encycl. **1**: 539. 1783.
Cereus polygonus De Candolle, Prodr. **3**: 466. 1828.
Pilocereus plumieri Lemaire, Rev. Hort. **1862**: 427. 1862.
Pilocereus schlumbergeri Weber in Schumann, Gesamtb. Kakteen 186. 1897.
Pilocereus polygonus Schumann, Gesamtb. Kakteen 196. 1897.

Plants at first simple, but when old with large, much branched tops, 3 meters high or more; trunk erect, 1 to 1.5 meters long below the branches; branches elongated, erect or ascending, 5 to 13-ribbed; young growth, at least in some forms, very blue; ribs rather narrow, 2 cm. high or more, grooved on their sides; areoles closely set, often only 1 cm. apart, producing long tawny wool, longer than the short acicular spines; old areoles without wool, vigorous and producing very different spines from the new ones; first spines acicular or setaceous, 1 to 1.5 cm. long, yellow, becoming gray or darker by age; supplementary spines elongated, subulate, yellowish brown, 2 to 7 cm. long; flowering areoles very woolly; flowers 5 to 6 cm. long, white; perianth-segments rounded or somewhat acutish; fruit globular, 3 to 4 cm. in diameter; seeds numerous, small, 2 cm. long, smooth, shining.

Type locality: Santo Domingo.

Distribution: Dry parts of Hispaniola.

Illustration: Plumier, Pl. Amer. ed. Burmann, pl. 196.

Plate VII, figure 1, is from a photograph taken by Paul G. Russell near Azua, Santo Domingo, in 1913.

FIG. 70.—Cephalocereus swartzii.

29. Cephalocereus gaumeri sp. nov.

Plant 6 meters high, light green, slender, often only 2 to 3 cm., but sometimes 6 cm., in diameter; ribs 8 or 9, 6 to 8 mm. high; areoles 6 to 10, bearing short felt and cobwebby hairs when young; flowering areoles bearing tufts of white wool 1 to 2 cm. long, 1 to 2 mm. apart; spines numerous, 15 to 25, acicular, 1 to 5 cm. long, yellowish brown when young; flowers "light green," 5 to 7 cm. long; scales on the ovary and lower part of the flower-tube few, minute, acute; scales on the upper part of the tube and outer perianth-segments broadly ovate, acute; inner perianth-segments oblong, acute; stamens included; style long-exserted; stigma-lobes 12; fruit depressed, brownish, somewhat ridged, 4.5 cm. long.

This species has been repeatedly collected by Dr. George F. Gaumer in Yucatan and has been distributed by him under various numbers. In 1918 he sent living plants to the New York Botanical Garden and these flowered the same year. This number (No. 23934) is made the type of the species.

Schott also collected this species in Yucatan and indicated it as a new species of *Cereus*, but this was never published. His sheet, now in the Field Museum of Natural History, bears drawings and paintings of the flowers and fruit.

30. Cephalocereus chrysacanthus (Weber) Britton and Rose, Contr. U. S. Nat. Herb. **12**: 416. 1909.

Pilocereus chrysacanthus Weber in Schumann, Gesamtb. Kakteen 178. 1897.
Cereus chrysacanthus Orcutt, West Amer. Sci. **13**: 63. 1902.

Plant 3 to 5 meters high, branching near the base; branches erect or ascending, glaucous; ribs about 12; areoles about 1 cm. apart; spines 12 to 15, the longer ones 3 to 4 cm. long, at first golden yellow, becoming darker in age; flowers borne in definite zones on one side of the branch, accompanied by dense masses of long white hairs, nocturnal, 7 to 8 cm. long, rose-red; fruit smooth, reddish or purplish, about 3 cm. in diameter, the flesh red; seeds black.

Type locality: Near Tehuacán, Mexico.

Distribution: Puebla and Oaxaca, Mexico.

Illustration: MacDougal, Bot. N. Amer. Des. pl. 17, in part, as *Pilocereus chrysacanthus;* Möllers Deutsche Gärt. Zeit. **29**: 356. f. 12.

Plate VII, figure 2, is from a photograph taken by Dr. MacDougal near Esperanza, Mexico, in 1906.

31. Cephalocereus maxonii Rose, Contr. U. S. Nat. Herb. **12**: 417. 1909.

Cereus maxonii Vaupel, Monatsschr. Kakteenk. **23**: 23. 1913.

Plant 2 to 3 meters high, with few long branches, erect or nearly so, in mature plants the tops of the branches for about 30 cm. clothed with white hairs 4 to 5 cm. long; ribs 6 to 8, acute, pale blue and somewhat glaucous; areoles small; spines about 10, slender, yellow, the central single, 4 cm. long, all nearly hidden in flowering areoles by the long white hairs; flowers purple, 4 cm. long; ovary naked except for a few small scales; fruit 3.5 cm. broad, broader than high; seeds brownish, reticulate, with an oblique basal hilum.

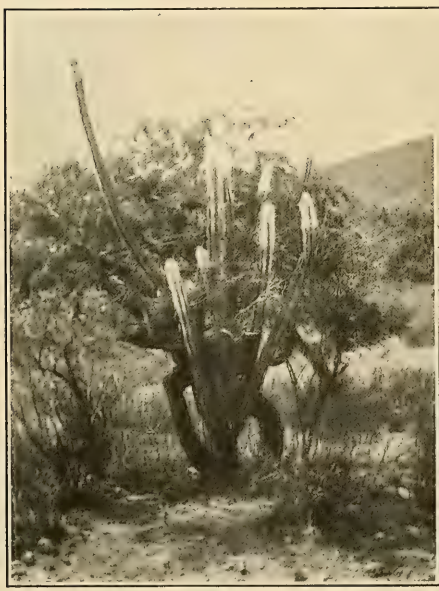


FIG. 71.—Cephalocereus maxonii.

FIG. 72.—Cephalocereus pianhyensis.

Type locality: Near El Rancho, Guatemala.

Distribution: Guatemala.

This species, although discovered only a few years ago, has been repeatedly collected since and is now to be found in living collections. It is called organo in Guatemala.

2. Large plant of *Cephalocereus chrysacanthus*.

1. Plants of *Cephalocereus polygonus*.

Illustration: Contr. U. S. Nat. Herb. 12: pl. 64.

Figure 71 is from a photograph taken near Salama, Guatemala, by W. R. Maxon in 1905.

32. Cephalocereus piauhyensis (Gürke).

Cereus piauhyensis Gürke, Monatsschr. Kakteenk. 18: 84. 1908.

Plant tree-like, 5 to 10 meters high; trunk woody, 3 to 5 dm. in diameter, with a smooth, nearly spineless bark; branches 20 to 100, slender, bluish green; ribs 13, low; areoles large, each flowering one bearing a tuft of long white hairs; spines numerous, yellowish brown, acicular, unequal, the longest 3 cm. long; flowers 3.5 to 4 cm. long, naked; fruit depressed, glaucous, 4 cm. broad, naked.

Type locality: Rocks of the Serra Branca, Piauhy, Brazil.

Distribution: On the dry hills in the caatinga along the São Francisco River in the States of Bahia and Piauhy, Brazil.

It resembles *Cephalocereus catingicola*, but has more slender branches, more ribs, smaller flowers, and smaller fruits. The trunk is woody, very heavy, and is often sawed into boards and used for making picture frames and the like. We have referred here the plant collected by Dr. Rose in Bahia without having seen the type of the species.

Figure 72 is from a photograph taken by Paul G. Russell east of Joazeiro, Bahia, Brazil, in 1915.

33. Cephalocereus lanuginosus (Linnaeus) Britton and Rose, Contr. U. S. Nat. Herb. 12: 417. 1909.

Cactus lanuginosus Linnaeus, Sp. Pl. 467. 1753.
Cereus lanuginosus Miller, Gard. Dict. ed. 8. No. 3. 1768, as to name only.
Cereus crenulatus Salm-Dyck, Observ. Bot. 3: 6. 1822.
Cereus lanuginosus glaucescens Pfeiffer, Enum. Cact. 80. 1837.
Pilocereus crenulatus Rümpler in Förster, Handb. Cact. ed. 2. 655. 1885.
Pilocereus lanuginosus Rümpler in Förster, Handb. Cact. ed. 2. 672. 1885.

Often tall and tree-like, either nearly simple or much branched; branches elongated, 9 to 13-ribbed, bright blue, somewhat glaucous; ribs rounded when young, separated by acute intervals; spines acicular, light yellow when young; young areoles all woolly, the flowering ones bearing dense tufts of wool, but this not very long; flowering areoles confined to 2 to 4 ribs on the south side of the plant; flower-buds short, green, rounded at the apex; flowers opening in the early evening, 6 cm. long; outer perianth-segments short, green; inner perianth-segments ovate, white, short; stamens numerous, included; style rigid, white, slightly exserted; stigma-lobes white; fruit depressed, red, naked.

Type locality: Island of Curaçao.

Distribution: Curaçao, Aruba, Bonaire.

Cereus crenulatus gracilior Salm-Dyck (Hort. Dyck. 63. 1834) is only a mentioned name.

Illustrations: Loudon, Encyl. Pl. f. 6861, as *Cactus lanuginosus;* Rep. Mo. Bot. Gard. 16: pl. 4, f. 5, as *Cereus lanuginosus;* Hermann, Par. Botavus pl. 115, as *Cereus erectus*, etc; Monatsschr. Kakteenk. 12: 56, as *Pilocereus lanuginosus*.

Figure 73 is from a photograph taken on Curaçao by Mrs. J. N. Rose in 1916.

34. Cephalocereus brooksianus Britton and Rose, Torreya 12: 14. 1912.

Cereus brooksianus Vaupel, Monatsschr. Kakteenk. 22: 66. 1912.

Plant 3 to 6 meters high, stout, much branched at base, bluish green, glaucous; ribs 8 or 9, obtuse; areoles closely set, in flowering specimens almost contiguous, bearing silky hairs when young and tufts of long white hairs at flowering ones; spines about 16, acicular, up to 3 cm. long, yellow, all somewhat similar, the upper ones in each areole ascending; flowers 5 to 6 cm. long, opening in the evening, odorless, somewhat flattened; tube stout, rigid, green, with only 2 or 3 small scales; inner perianth-segments about 10, rather rigid, broad, a little spreading; throat of flower wide; stamens very numerous, all included; filaments white, attached all over the long broad throat, 3 cm. long; tube proper very short, 8 mm. long or less; style white, rigid, 5 cm. long; ovary naked.

Type locality: Near Novaliches, about six miles south of Guantánamo, Cuba.

Distribution: Dry, rocky situations, provinces of Oriente and Santa Clara, Cuba.

Plate VIII, figure 1, is from a plant collected by Dr. Britton at Guantánamo Bay, Cuba, in 1909, which flowered at the New York Botanical Garden in 1913.

35. Cephalocereus royenii (Linnaeus) Britton and Rose, Contr. U. S. Nat. Herb. **12:** 419. 1909.

Cactus royenii Linnaeus, Sp. Pl. 467. 1753.
Cereus royenii Miller, Gard. Dict. ed. 8. No. 7. 1768.
Cereus fulvispinosus Haworth, Syn. Pl. Succ. 183. 1812.
Cactus fulvispinosus Sprengel, Syst. **2:** 496. 1825.
Cereus floccosus Otto in Pfeiffer, Enum. Cact. 81. 1837.
Cereus armatus Otto in Pfeiffer, Enum. Cact. 81. 1837.
Pilocereus floccosus Lemaire, Illustr. Hort. **13:** under pl. 470. 1866.
Cereus leiocarpus Bello, Anal. Soc. Esp. Hist. Nat. **10:** 276. 1881.
Pilocereus barbatus Rebut in Förster, Handb. Cact. ed. 2. 650. 1885.
Pilocereus royenii Rümpler in Förster, Handb. Cact. ed. 2. 682. 1885.
Pilocereus royeni armatus Salm-Dyck in Förster, Handb. Cact. ed. 2. 682. 1885.
Pilocereus strictus fouachianus Schumann, Gesamtb. Kakteen 190. 1897.
Pilocereus fulvispinosus Schumann, Gesamtb. Kakteen 196. 1897.
Pilocereus fouachianus Weber in Gosselin, Bull. Mus. Hist. Nat. Paris **10:** 386. 1904.
Cereus fouachianus Vaupel, Monatsschr. Kakteenk. **23:** 25. 1913.

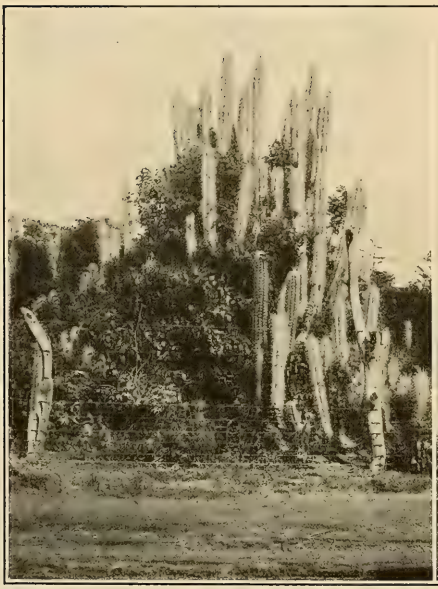


FIG. 73.—Cephalocereus lanuginosus.

FIG. 74.—Cephalocereus royenii.

Stout, 2 to 8 meters high or more, either branching near the base or with a short definite trunk up to 3 dm. in diameter; branches stout, erect or ascending, glaucous, green to blue; ribs 7 to 11, high; areoles close together; spines acicular, very variable, often only 1 cm. long, but sometimes 6 cm. long, yellow; young areoles bearing soft wool; flowering areoles producing tufts of long white hairs; flowers about 5 cm. long, greenish yellow to purplish; inner perianth-segments white, acute; fruit reddish or green, 5 cm. broad; pulp red; seeds black, shining.

Type locality: America, but no definite locality cited.

Distribution: Antigua to Anegada, St. Croix, St. Thomas, Culebra, Porto Rico, Mona, and Desecheo.

Philip Miller states that this species was sent to him from the British Islands of America in 1728. The combination *Cereus royenii* is generally credited to Haworth (1812), but it was first used by Miller in 1768, although the true *Cactus royenii* of Linnaeus may not be the one he actually described.

Cereus barbatus Wendland (Salm-Dyck, Cact. Hort. Dyck. 1844. 29. 1845) was given as a synonym of *Cereus floccosus*. *Cereus royenii armatus* Salm-Dyck (Walpers, Repert. Bot. 2: 276. 1843), and *C. royenii floccosus* Monville (Labouret, Monogr. Cact. 343. 1853) are given only as synonyms.

Cephalocereus fouachianus Quehl (Monatsschr. Kakteenk. 20: 39. 1910), name only, belongs here.

Cereus gloriosus (Pfeiffer, Enum. Cact. 80. 1837) was printed as a synonym.

Illustrations: Monatsschr. Kakteenk. 12: 56, as *Pilocereus royenii;* Journ. N. Y. Bot. Gard. 7: f. 4, this last as *Pilocereus* sp.

Figure 74 is from a photograph taken by Frank E. Lutz on Desecheo Island, in 1914; figure 69 represents a flower of the plant from Culebra Island, collected by Dr. Britton.

FIG. 75.—Cephalocereus robustus.

FIG. 76.—Cephalocereus cometes.

36. Cephalocereus robustus nom. nov.

Pilocereus ulei Schumann, Gesamtb. Kakteen Nachtr. 64. 1903. Not *Cephalocereus ulei* Gürke, 1908.
Cereus ulei Berger, Rep. Mo. Bot. Gard. 16: 70. 1905.

Tall, much branched, with a rather indefinite trunk, 3 to 7 meters high, pale whitish blue, roughish; ribs 8 or 9, high, separated by acute intervals; areoles closely set, with short dark spines and longer silky hairs; 3 of the ribs bearing flowers and their flowering areoles producing long, curly, white hairs, 5 to 6 cm. long; flower nocturnal, 5 cm. long, its tube proper 1 cm. long; perianth-segments acute, nearly white; stamens numerous, scattered all over the broad long throat, scarcely exserted; anthers purple; style slender, included; fruit 2 cm. in diameter; seeds minute, black, shining.

Type locality: Cabo Frio, Rio de Janeiro, Brazil.

Distribution: Coast of State of Rio de Janeiro, Brazil.

This species is common on the hills about Araruama Lake and near Cabo Frio, where it forms small forests and is the dominant feature of many landscapes. Dr. Rose and Señor Campos Porto obtained from São Pedro, near Cabo Frio, a living specimen (No. 20706) which flowered in the New York Botanical Garden in July 1916.

This plant is very unlike any of the other Brazilian species of this genus, of which there are at least three in the State of Rio de Janeiro.

Figure 75 is from a photograph of a specimen collected by Dr. Rose near São Pedro, Rio de Janeiro, in 1915.

37. Cephalocereus cometes (Scheidweiler) Britton and Rose, Contr. U. S. Nat. Herb. 12: 416. 1909.

Cereus cometes Scheidweiler, Allg. Gartenz. 8: 339. 1840.
Pilocereus jubatus Salm-Dyck in Förster, Handb. Cact. 356. 1846.
Cereus flavicomus Salm-Dyck, Cact. Hort. Dyck. 1849. 202. 1850.
Pilocereus flavicomus Rümpler in Förster, Handb. Cact. ed. 2. 658. 1885.

Erect, cylindric; ribs 12 to 15 (Schumann says 9 to 12), hardly tuberculate, obtuse; areoles close together, round; spines unequal, straight, spreading, 2 cm. long or less, flesh-colored or brownish, becoming gray; flowering areoles bearing masses of yellow hairs or wool, longer than the spines; neither the flowers nor the fruit known.

Type locality: Near San Luis Potosí, Mexico.

Distribution: State of San Luis Potosí, Mexico.

A small specimen in the New York Botanical Garden (No. 6710) has 12 ribs, with areoles bearing long white deciduous hairs and short spines, brownish at first, becoming gray.

Förster (Handb. Cact. 357. 1846) gave both *Pilocereus cometes* Mittler and *Cereus jubatus* Salm-Dyck, as synonyms of *P. jubatus*. See also Schelle, Handb. Kakteenk. 104. 1907.

Figure 76 is from a photograph of a plant in the collection of the New York Botanical Garden obtained from M. Simon of St. Ouen, Paris, France.

38. Cephalocereus leucocephalus (Poselger) Britton and Rose, Contr. U. S. Nat. Herb. 12: 417. 1909.

Pilocereus leucocephalus Poselger, Allg. Gartenz. 21: 126. 1853.
Pilocereus houlletii Lemaire, Rev. Hort. 1862: 428. 1862.
Pilocereus foersteri Lemaire, Illustr. Hort. 13: under pl. 472. 1866.
Cereus houlletii Berger, Rep. Mo. Bot. Gard. 16: 70. 1905.

Plants 2 to 5 meters high, branched below, the branches 3 to 15, erect or ascending; ribs usually 12, low; spines about 10 in each cluster, acicular, 12 to 20 mm. long; flowering areoles clustered on one side of the plant toward the top and producing an abundance of long white hairs (sometimes 4 to 10 cm. long); flowers and fruit not seen.

Type locality: Near Horcasitas, Sonora, Mexico.

Distribution: Sonora and southeastern Chihuahua, Mexico.

This species has been much misunderstood in recent years. The specific name *houlletii* is a clear synonym of the older name *leucocephalus*. Both were described as species of *Pilocereus* and based on plants from Sonora, Mexico, but no further Sonoran material being collected the name was transferred to an East Mexican species from Vera Cruz

(*Cephalocereus sartorianus*), and is sometimes applied to the Guatemalan species (*C. maxonii*). As a result of Dr. Rose's explorations in Sonora in 1910, additional material, both living and herbarium, was obtained, which enables us to reëstablish this species as Sonoran.

In 1908, Dr. Palmer sent photographs and specimens of a *Cephalocereus* from Batopilas, Chihuahua, which we believe may belong here.

Cereus foersteri (Sencke, Cat. 1861) and *Pilocereus marschalleckianus* (Zeissold, Cat. 1899) are given by Schumann as synonyms of this species. The latter is mentioned in Nicholson's Dictionary of Gardening (Suppl. 602. 1901) as having been introduced but very rare in cultivation.

Illustrations: Dict. Gard. Nicholson 3: f. 153; Gartenwelt 7: 291; Knippel, Kakteen pl. 29; Lemaire, Cact. f. 5, 6; Monatsschr. Kakteenk. 3: 145; 11: 76; 21: 37; 22: 133; Engler and Prantl, Pflanzenfam. 3[6a]: f. 59, A, B; Rev. Hort. 1862: f. 38 to 41; Förster, Handb. Cact. ed. 2. f. 89, 90; Rümpler, Sukkulenten f. 77; Rev. Hort. Belge 40: after 184, all as *Pilocereus houlletii;* Cact. Journ. 2: 5, as *P. houlletianus;* Rep. Mo. Bot. Gard. 16: pl. 4, f. 3, 4, as *Cereus houlletii.*

Figure 77 is from a photograph by E. Palmer, at Batopilas, Chihuahua, in 1908.

FIG. 77.—Cephalocereus leucocephalus.

39. Cephalocereus sartorianus Rose, Contr. U. S. Nat. Herb. 12: 419. 1909.

Plant 3 to 5 meters high or more, with nearly erect branches, these 7 to 10 cm. in diameter, bluish or bluish green; ribs (in the three individuals examined) 7, 2 cm. high, marked by a pair of grooves descending obliquely, one on each side, from each areole; areoles closely set, usually 1.5 cm. apart; radial spines at first 7 or 8, others apparently developing later; central normally one; all spines short, 1 cm. long or less, at first straw-colored, in age grayish; all areoles producing few or many cobwebby hairs; flowering areoles appearing on one side of the plant, in the specimen under observation on a single rib, and producing long white hairs 4 to 6 cm. long; flowers 6 to 8 cm. long, "dirty rose-red"; fruit red.

Type locality: State of Vera Cruz, Mexico.

Distribution: Vera Cruz, Mexico.

In the original description, based on material sent by Dr. C. A. Purpus, we stated that the branches were "light or yellowish green, apparently not pruinose." The illustration in Blühende Kakteen referred to below, however, shows very blue and probably pruinose branches.

It seems to grow in thickets, and is very slender, with a few slender, nearly erect branches bearing large masses of wool at the top.

Illustration: Blühende Kakteen 2: pl. 79, as *Pilocereus houlletii.*

40. Cephalocereus palmeri Rose, Contr. U. S. Nat. Herb. 12: 418. 1909.

Cereus victoriensis Vaupel, Monatsschr. Kakteenk. 23: 24. 1913.

Tall, 2 to 6 meters high, with 20 branches or more (often 5 to 8 cm. in diameter), dark green or when young glaucous and bluish; ribs 7 to 9, rounded on the edge, rather closely set, clothed from top downward for 20 to 30 cm. with long white hairs (4 to 5 cm. long) usually hiding the brown

spines; radial spines 8 to 12, slender, the central one much longer than the others, 2 to 3 cm. long; areoles 1 cm. apart, scarcely woolly except toward the top; flowers 6 cm. long, somewhat tubular, purplish to brownish, the ovary without spines or hairs; fruit globular, about 6 cm. in diameter, naked but the surface somewhat warty; seeds black, shining, minutely pitted, 2 mm. long, oblique at bases.

Type locality: Near Victoria, Mexico.

Distribution: Eastern Mexico.

The spines of seedlings are yellow. This species flowered in the New York Botanical Garden in June 1918.

E. O. Wooton made a trip into eastern Mexico in 1919 and obtained a photograph of a large *Cephalocereus*, presumably this species. The plant was common on the coastal plain and extended the known range of this species northwards. Mr. Wooton's locality was on the Chamal Hacienda, about halfway between Matamoras and Tampico.

41. Cephalocereus tweedyanus sp. nov.

Sometimes only 1 to 2 meters high and much branched at base, or sometimes tall, 5 to 7 meters high and branched above, with a large woody trunk; branches 8 to 10 cm. in diameter, ascending or slightly spreading, bluish green when young, grayish green in age; ribs 7 to 9, obtuse; spines brown when young; radial spines several, 1.5 cm. long or less; central spines often solitary, porrect, 2 to 3 cm. long; flowering areoles bearing long white wool; flowers 7 cm. long; inner perianth-segments short, oblong, obtuse; scales and outer perianth-segments obtuse, purplish; fruit nearly globular, about 4 cm. in diameter, reticulated.

FIGS. 78 and 79.—Cephalocereus tweedyanus.

The species is based on two collections from widely separated localities in Ecuador, one being from the Pacific coast near sea-level, and the other from east of the coast range at an altitude of about 3,000 feet. The first was collected by J. N. Rose and George Rose in thickets near Santa Rosa, Province Del Oro, October 18, 1918 (No. 23494, type), and the other east of Ayapamba, same province, October 15, 1918 (No. 23454). This is the first species of *Cephalocereus* reported from Ecuador and is the most southern species known on the west coast of South America. It is dedicated to Mr. Andrew Mellick Tweedy, who assisted Dr. Rose in his Ecuadorean Expedition in 1918.

Figure 78 shows the type plant as it grows in thickets along the coast at Santa Rosa; figure 79 shows it as it grows in the open below Ayapamba, both from photographs by George Rose; figure 80 shows a flower and figure 81 a fruit collected by Dr. Rose near Ayapamba, Ecuador, in 1918.

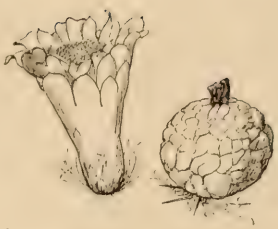


FIG. 80.—Flower of C. tweedyanus. ×0.5.
FIG. 81.—Fruit of same. ×0.5.

42. **Cephalocereus alensis** (Weber) Britton and Rose, Contr. U. S. Nat. Herb. **12**: 415. 1909.

Pilocereus alensis Weber in Gosselin, Bull. Mus. Hist. Nat. Paris **11**: 508. 1905.
Cereus alensis Vaupel, Monatsschr. Kakteenk. **23**: 23. 1913.

Erect, sometimes 5 to 6 meters high, branching from the base; branches rather slender, spreading, 12 to 14-ribbed, the ribs somewhat tuberculate; spines 10 to 14, acicular, about 1 to 1.5 cm. long, brownish; flowering areoles on one side of the stem, developing white or yellowish hairs 5 cm. long; flowers light purple to purplish green; perianth-segments fleshy, usually rounded at apex; ovary nearly naked; fruit not known.

Type locality: Sierra del Alo, Mexico.

Distribution: Western Mexico.

The type of the species was collected by Léon Diguet and is preserved in the Museum of Paris, where it was studied by Dr. Rose in 1912. To this species we would refer specimens collected in Jalisco, Mexico, in 1892, by M. E. Jones.

Illustration: Bull. Soc. Acclim. France **52**: f. 16, as *Pilocereus alensis*.

FIG. 82.—Cephalocereus colombianus.

43 **Cephalocereus colombianus** Rose, Contr. U. S. Nat. Herb. **12**: 416. 1909.

Cereus colombianus Vaupel, Monatsschr. Kakteenk. **23**: 23. 1913.

Plant 5 to 6 meters high, more or less branched throughout, the branches nearly erect; ribs 8, obtuse; spines many, 25 at an areole or more, long and slender; wool of the areoles long and white, produced for 1 meter down from the top of the plant; flowers 7 cm. long, smooth, pale pink.

Type locality: Venticas del Dagua, Colombia.
Distribution: Northwestern Colombia.

In our original description we referred here specimens from northern Colombia which we now include in *Cephalocereus russelianus*.

Illustrations: Contr. U. S. Nat. Herb. **12**: pl. 62, 63.

Figure 82 is from a photograph of the plant; figure 83 *a* shows a piece of the stem; figure 83 *b* a cross-section of the stem; figure 83 *c* a flower; and figure 83 *d* a flower-bud; all are from photographs of the type specimen by Henry Pittier.

44. **Cephalocereus purpusii** sp. nov.

Stems slender, 2 to 3 meters high, simple or more or less branched; branches green, erect, 3 to 4 cm. in diameter, usually simple; ribs 12, low, 5 to 6 mm. high, separated by narrow intervals; areoles closely set, 10 mm. apart or less on the lower part of the stem, but much closer together toward the top, on the young growth with long silky white hairs, but on old parts without hairs; spines acicular, swollen at base, 1 to 3 cm. long, bright yellow at first, in age gray.

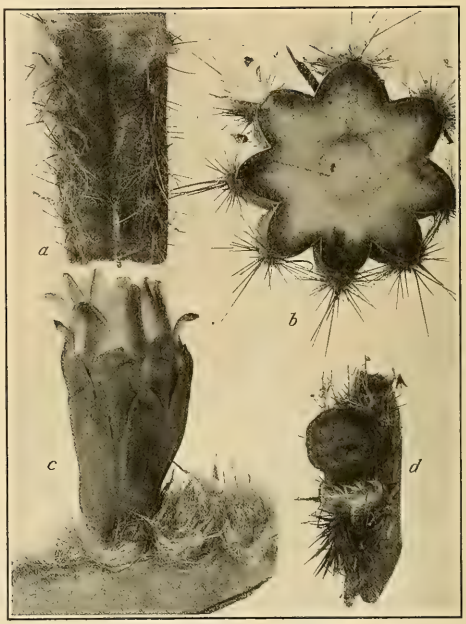


FIG. 83.—Cephalocereus colombianus.

Collected by Rose, Standley, and Russell at Mazatlan, Mexico, on the hills near the town overlooking the sea, March 31, 1910 (No. 13749, type), and also a short distance inland at Guadalupe, in thickets, April 18, 1910 (No. 14741).

This species differs from the other Mexican ones in having very slender stems. It is named for the veteran collector, Dr. C. A. Purpus, who writes that he collected the species several years earlier than above recorded. We have not, however, seen his specimens.

The plant is growing in the New York Botanical Garden, from Dr. Rose's collection at Mazatlan.

45. **Cephalocereus catingicola** (Gürke).

Cereus catingicola Gürke, Monatsschr. Kakteenk. **18**: 54. 1908.

Tree-like, 3 to 10 meters high, with a short definite trunk and a large, much branched top, bluish green; ribs 4 or 5, separated by broad intervals; areoles large, woolly; spines yellow when young, numerous, unequal, the longest 3 cm. long; flowers 6 to 8 cm. long, 6 cm. broad when fully open, with a broad throat, opening in the evening, odorless; flower-tube short, about 1 cm. long, with broad scales near its top, these green with brownish margins; perianth-segments numerous, broad, short, white, stiff; anthers dehiscing soon after the flowers open; filaments short, the lower ones much longer than the upper one but all included, attached all over the throat; style stout, soon exserted, at first raised against the upper part of the throat, white; stigma-lobes at first white but pinkish the second day after anthesis; fruit broader than high, glaucous, 6 to 7 cm. broad, capped by the withered perianth; rind thick; pulp purple.

Type locality: In the caatinga of Bahia, Brazil.

Distribution: Common in the caatinga of Bahia.

Illustration: Monatsschr. Kakteenk. **18**: 55, as *Cereus catingicola*.

Plate VIII, figure 2, shows the top of a plant brought from Bahia by Dr. Rose in 1915.

M. E. Eaton del.

1. Top of flowering stem of *Cephalocereus brooksianus*.
2. Top of stem of *Cephalocereus catingicola*.
3. Top of stem of *Cephalocereus phaeacanthus*.
4. Flowering branch of *Leptocereus assurgens*.

(Natural size.)

46. Cephalocereus brasiliensis sp. nov.

Somewhat branching at base, 1 to 3 meters high, producing long, slender, weak branches, these at first erect, but soon spreading or reclining, bright green when old, but when young somewhat glaucous; branches at base nearly square in section, but toward the tip with 4, sometimes 5, prominent obtuse ribs; areoles very close together, with long white hairs longer than the spines; radial spines several, very short, brown, spreading, acicular; central spines generally solitary, porrect, 1 to 2 cm. long; flowers 5 cm. long; fruit globular.

FIG. 84.—Cephalocereus brasiliensis growing above Cephalocereus fluminensis.

Collected by Rose and Russell on the base of Corcovado, Rio de Janeiro, Brazil, July 10, 1915 (No. 20190).

This plant is not uncommonly found with *Cephalocereus fluminensis*, but is not as abundant as that species.

In the open flats and valleys toward Cabo Frio, Brazil, similar plants occur, but they are stouter and usually erect; of these, flowers and fruit were not obtained (Rose, No. 20705).

Figure 84 is from a photograph taken by Paul G. Russell of the type plant.

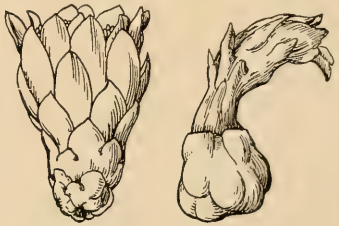


FIG. 85.—Flower of C. phaeacanthus. ×0.7.
FIG. 86.—Fruit of same. ×0.7.

47. Cephalocereus phaeacanthus (Gürke).

Cereus phaeacanthus Gürke, Monatsschr. Kakteenk. 18: 57. 1908.

Slender, usually branching at base, rarely branching above, more or less erect, often 4 meters high, the branches 4 to 9 cm. in diameter; ribs usually 13, low, narrow, bearing approximate areoles about 5 mm. apart, with acicular spines and small tufts of short white wool; spines numerous, when young yellowish brown, 1 to 1.5 cm. long; flowers 6 cm. long, slightly bent upward near the top of the tube, the limb 6 cm. broad when fully expanded; perianth-tube and ovary bearing several ovate scales; outer perianth-segments greenish brown; inner perianth-segments white, acute; upper series of stamens 2 cm. long; lower series of stamens 4 cm. long; filaments green; style white; fruit 1.5 cm. in diameter, smooth, somewhat tubercled; seeds 2 cm. long.

Type locality: Maracás, Bahia, Brazil.

Distribution: In thickets, State of Bahia, Brazil.

We have placed this species near the end of the genus, for it is very unlike the other species and may not be congeneric with them. It has very slender stems, low ribs, no long hairs at the flowering areoles, and a bent flower with a very small, flattened ovary.

Plate VIII, figure 3, shows the top of a plant brought by Dr. Rose from Toca da Onca, Brazil, in 1915. Figure 85 shows the flower, and figure 86 shows the fruit and withering perianth.

48. Cephalocereus ulei Gürke, Monatsschr. Kakteenk. **18**: 85. 1908.

"Trunk upright, strongly branched, columnar, several meters high, and in this instance 7 cm. in diameter. Ribs 18 to 20, blunt, separated by deep furrows from each other and rather deeply crenate, 8 to 9 mm. high, 7 to 8 mm. wide at the base, semi-elliptic and with rounded angles; areoles 10 to 12 mm. apart, elongated, 4 to 5 mm. in diameter, covered with gray wool, developing on one side of the crown of a branch into a stout, brownish, dirty yellow cephalium, with wool about 8 to 10 mm. long; radial spines 13 to 15, radiating, extending obliquely from the plant body, 10 to 12 mm. long; central spines 2 or 3, somewhat longer than the radial spines, up to 18 mm. long; all of the spines brown, not very sharp, elastic; flowers from the cephalium short, tubular, 45 mm. long, 17 to 20 mm. in diameter; ovary and tube thickly covered with lanceolate or narrowly triangular scales, 2 to 4 mm. long and bearing in their axils fascicles of short, closely lying reddish-brown hairs; petals white, lanceolate-spatulate, with short tips, the innermost 10 mm. long and 5 mm. wide; anthers arising from the upper part of the tube, not extending beyond the perianth; filaments 15 mm. long; pistil 27 mm. long, the stigma slightly exceeding, with 10 stigma-lobes 3 mm. long; fruit pear-shaped, 6 cm. long, 4 cm. in diameter; seeds black, shining, 1.5 mm. long.

"Of the hitherto known species of the genus *Cephalocereus* only one comes from Brazil, the rest from Mexico. The Brazilian species, *C. melocactus* Schumann, has only 12 ribs; 3 to 6 radial spines; red flowers, 3 cm. long; and through these characteristics differs from the here-described species." Translated by Paul G. Russell from Ule, Monatsschr. Kakteenk. **18**: 85. 1908.

Type locality: Serra do S. Ignacio, Bahia, Brazil.

Distribution: Known only from the type locality.

The plant is known to us only from the description and illustration. It would seem from these to be related to *C. dybowskii*.

Illustrations: Bot. Jahrb. Engler **40**: Beibl. **93**: pl. 9; Vegetationsbilder **6**: pl. 18.

PUBLISHED SPECIES, PERHAPS OF THIS GENUS.

The species of this genus have often been described under *Pilocereus*, while others have appeared under *Cereus*. There are also some species of *Cephalocereus* which we do not know, and these are all grouped here under the above heading.

CEPHALOCEREUS HERMENTIANUS (Monville) Britton and Rose, Contr. U. S. Nat. Herb. **12**: 416. 1909.

Cereus hermentianus Monville, Illustr. Hort. **6**: Misc. 90. 1859.
Pilocereus hermentianus Lemaire in Weber, Dict. Hort. Bois 965. 1898.

Upright, slender, 3 meters high, 5 to 7 cm. in diameter, branching; ribs about 19, rounded, shallow; areoles close together, round, with short brown wool and silky, persistent, hanging hairs; spines about 20, small, slender, yellowish; flowers 5 to 6 cm. long.

Type locality: Not cited.

Distribution: Haiti, according to Weber.

Monville did not know the origin of this species, but Weber assigned it to Haiti without question. We do not know any cactus from Hispaniola with 19 ribs, but further explorations may prove its occurrence there.

PILOCEREUS ALBISETOSUS (Haworth) Schumann, Gesamtb. Kakteen 196. 1897.

Cereus albisetosus Haworth, Suppl. Pl. Succ. 77. 1819.

This certainly does not belong to this genus. It may be a *Selenicereus*. Evidently a low creeping plant, green, 5-angled, with areoles bearing brown wool and several white setaceous spines. It is a native of "Domingo," and is said to be similar to *Cereus reptans* It was introduced into England by A. B. Lambert in 1816.

PILOCEREUS VERHEINEI Rümpler in Förster, Handb. Cact. ed. 2. 690. 1885.

Columnar, simple so far as known, pale green, the apex covered with white wool, soon turning gray; ribs 12 or 13, 8 to 10 mm. high, obtuse; areoles 6 to 8 mm. apart, 2 to 3 mm. in diameter; spines yellowish at first, in age gray; radial spines 7 or 8, spreading, subulate, 1 to 1.5 cm. long; central spine solitary or wanting, 1 cm. long.

This species, recognized by Schumann as a good species of *Pilocereus*, we do not know. Its flowers and fruits are unknown and hence its exact place can not be determined. Its origin, too, is unknown and so far as we are aware it is not now in cultivation. The above description has been compiled.

PILOCEREUS GLAUCESCENS Labouret, Monogr. Cact. 279. 1853.

Pilocereus coerulescens Lemaire, Rev. Hort. **1862**: 427. 1862.
Pilocereus andryanus Cels in Lemaire, Rev. Hort. **1862**: 427. 1862, as synonym.

"Stem erect, at first simple, later probably becoming branched, dark bluish gray, glaucescent, bearing 10 rounded, blunt, inflated ribs; sinuses sharp, shallow, with age becoming effaced toward the base of the stem; areoles close together, almost confluent toward the base of the stem, rounded, with short almost black tomentum, furnished with hairs and very abundant, fine, undulating, weak, white bristles, especially on the areoles recently developed and toward the summit of the stem, rarer on the lower areoles; spines radiating, of different lengths and thicknesses, biserial, the exterior fine, divergent, inserted to the number of 5 or 6 on each side of the areole, the interior stouter, disposed irregularly in the center, to the number of 5 or 6 also, all of a dull yellow, brown at the base. The plant is 8 cm. in diameter by about 20 cm. in height; the bristles and the hairs of the areoles are about 1 to 2 cm. long; the interior spines, which are the strongest, are 10 to 15 mm. long; flowers unknown.

"The general aspect of this plant, which I believe is unique in Europe, resembles that of a *Pilocereus*. However, in the absence of definite and certain characters, it is not without doubt that we place it in the genus near *Pilocereus columna* and *chrysomalus*, as much for the long bristles of its areoles as for its branching stem. If later, however, its flower makes it a *Cereus*, its place would very probably be among the *Lanuginosi*, just after the *Coerulescentes*, and in th is event, which seems doubtful to me because of its many points of resemblance to *Pilocereus*, it would certainly constitute one of the most remarkable species of *Cerei*."

The above is taken from Labouret's monograph.

The Index Kewensis refers one of these names to *Cereus glaucescens* and the other to *Cereus coerulescens*, but doubtless in error, while the last is called *Cereus andryanus* by Schumann (Gesamtb. Kakteen 196). Lemaire says his plant came from Serra do Cipo, District Diamartina, Brazil.

PILOCEREUS ALBISPINUS (Salm-Dyck) Rümpler in Förster, Handb. Cact. ed. 2. 649. 1885.

Cereus albispinus Salm-Dyck, Observ. Bot. **3**: 5. 1822.
Cereus crenatus Salm-Dyck in Labouret, Monogr. Cact. 341. 1853.
Pilocereus albispinus crenatus Rümpler in Förster, Handb. Cact. ed. 2. 649. 1885.
Cereus serpentinus albispinus Weingart, Monatsschr. Kakteenk. **18**: 30. 1908.

Columnar, usually simple but sometimes branched at base; branches with 8 to 12 low, obtuse ribs, these dull green and woolly at apex; radial spines 8 to 13, spreading, white except at tip and there red; central spines 1 to 4; flowers and fruit not known.

Type locality: Curaçao, according to Schumann, but nothing like it was found there by Dr. Britton in 1913.

Distribution: Unknown. Rümpler says it is South America.

Cereus albispinus major Monville (Labouret, Monogr. Cact. 341. 1853) is undescribed.

The original publication of *Cereus acromelas* (Hortus, Berol. Ind. Cact. 1833) we have not seen. Pfeiffer refers it to *Cereus crenulatus* and Labouret to *C. albispinus*.

Cereus octogonus Otto (Allg. Gartenz. **1**: 365. 1833) and *C. decagonus* (Pfeiffer, Enum. Cact. 85. 1837) are unpublished names for this species.

We have studied a living specimen of this plant which is growing in the New York Botanical Garden. Its flowers and fruit are not known. See note under *Cephalocereus leucostele;* see also Weingart's reference (Monatsschr. Kakteenk. **18**: 30. 1908).

PILOCEREUS FLAVISPINUS Rümpler in Förster, Handb. Cact. ed. 2. 659. 1885.
Cereus flavispinus Salm-Dyck, Observ. Bot. 3: 5. 1822.

These names were both referred by Schumann to *Pilocereus strictus*. The former is said to come from South America and the latter from tropical America. The specific name comes from *Cactus flavispinus* Colla (Hort. Ripul. 24) and probably applies to some Chilean plant.

CEREUS GHIESBREGHTII Schumann, Gesamtb. Kakteen 81. 1897.

Columnar, simple or somewhat branched, short-jointed; joints nearly as broad as long; ribs 6 to 8, separated by broad intervals; radial spines 10 to 12, subulate, about 1.4 cm. long; central spines 2 to 4, 5 cm. long; flowers and fruit unknown.

Type locality: Mexico.

Distribution: Known only from type locality.

A plant in the New York Botanical Garden so named suggests a small *Cephalocereus* and here we refer the species for the present. Schumann's illustration suggests a greenhouse seedling and may differ widely from the wild form.

This is different from *Pilocereus ghiesbrechtii* Rümpler (Förster, Handb. Cact. ed. 2. 661. 1885) which Rümpler says (p. 662) is in the Paris Gardens as *Echinocactus ghiesbrechtii*. This is doubtless what Salm-Dyck (Allg. Gartenz 18: 395. 1850) described under that name, a species which has not been recognized by later students.

Illustration: Schumann, Gesamtb. Kakteen f. 16.

NOTES.

A species of *Cephalocereus* with woolly areoles occurs at Tehuantepec, Mexico, as shown by a photograph obtained there by O. F. Cook and G. N. Collins of the United States Department of Agriculture.

A species of *Cephalocereus*, with slender, deflexed, white spines, occurs at Coro, Venezuela, as shown by a plant brought by Dr. Rose to the New York Botanical Garden in 1916.

A species of *Cephalocereus* inhabits the Serra de Borborema, Pernambuco, Brazil, as shown by a photograph received from A. Löfgren; his notes describe it as several meters high, with stout, erect branches, numerous low ribs, the yellow pseudocephalium on one side, elongated, the acicular spines yellow.

A very peculiar plant which was collected by Luetzelburg near Bom Jesus, Bahia altitude about 1,700 meters, should probably be placed in this genus and next to *C. leucostele*. It is called the bottle cactus on account of its shape. A brief description follows

Plant simple, short, and stubby, 10 cm. high; globular at first, in time lengthening from 20 to 40 cm. and becoming more or less bottle-shaped, the upper part being more slender and jointed; ribs 12 to 15, acute; areoles close together, arranged along the ribs; spines from the upper areoles white, elongated, and soft; flowers reddish, 8 to 9 cm. long, opening during the day.

4. ESPOSTOA gen. nov.

Columnar plants with numerous low ribs and when flowering developing a pseudocephalium similar to that of some species of *Cephalocereus;* areoles strongly armed with spines, and bearing long white hairs; flowers small, short-campanulate, nearly hidden by the surrounding wool, probably opening at night; tube short; outer perianth-segments pinkish, the inner ones probably white; stamens and style short, included; scales on ovary and flower-tube small, acute, with long silky caducous hairs; fruit subglobose to broadly obovoid, smooth, its flesh pure white, slightly acid, very juicy, edible; seeds very small, black, shining.

This genus resembles the typical species of *Cephalocereus*. Berger suggested that it was an *Oreocereus*, but this was before he had seen any flowers of the latter; we now know that there is much difference not only in the flowers but also in the fruit and seeds. It is named for Nicolas E. Esposto, a very keen botanist who is connected with the Escuela Nacional de Agricultura at Lima, Peru.

1. Espostoa lanata (HBK.).

Cactus lanatus Humboldt, Bonpland, and Kunth, Nov. Gen. et. Sp. **6**: 68. 1823.
Cereus lanatus De Candolle, Prodr. **3**: 464. 1828.
Pilocereus dautwitzii Haage, Gard. Chron. **1873**: 7. 1873.
Pilocereus haagei Rümpler in Förster, Handb. Cact. ed. 2. 665. 1885.
Pilocereus lanatus Weber, Dict. Hort. Bois 965. 1898.
Cereus dautwitzii Orcutt, West Amer. Sci. **13**: 63. 1902.
Cleistocactus lanatus Weber in Gosselin, Bull. Mens. Soc. Nice **44**: 37. 1904.
Pilocereus lanatus haagei Jostmann, Monatsschr. Kakteenk. **21**: 25. 1911.
Oreocereus lanatus Britton and Rose, Stand. Cycl. Hort. Bailey **4**: 2404. 1916.

Plant simple, 2 to 4 meters high, sometimes with several strict branches or with a simple erect stem, 4 to 10 cm. in diameter, with many spreading branches at first nearly horizontal or curved upward and becoming erect near the tip, the tip hidden under a mass of hairs and brown bristles; ribs numerous, 20 to 25, low, 5 to 8 mm. high, rounded; areoles rather large, 5 to 6 mm. apart; radial spines numerous, acicular, 4 to 7 mm. long, brownish, intermixed with long white hairs; central spine solitary, yellow or brown to black, subulate, 2 to 5 cm. long; flowers borne on one side of the stem from a prominent pseudocephalium, 3.5 to 5 cm. long; scales on the tube many, triangular-lanceolate, acute, about 6 cm. long; fruit 3 to 4 cm. long, juicy, edible, white except the small pinkish scales; seeds 1 mm. broad.

Type locality: Near Rio Aranza and Guancabamba, Ecuador.

Distribution: On the dry hills of northern Peru and Ecuador, altitude 1,200 to 2,250 meters.

FIGS. 87 and 88.—Espostoa lanata.

In 1918, while in Ecuador, Dr. Rose attempted to reach the exact locality of Humboldt's *Cactus lanatus*, but was unsuccessful. In the Catamayo Valley somewhat north of Humboldt's station and in what is doubtless a part of the same desert he collected this species and upon this our description above is largely based. These plants are so different in habit from other plants collected by Dr. Rose in central Peru that we have been very much in doubt whether they should all be referred here or a part separated as a new species. That there is more than one species in this genus has been further suggested since receiving a photograph from G. M. Dyott, taken at Chagual, on the west bank of the Marañon River, in northern Peru. In this photograph are shown several very striking cactus plants, perhaps of this genus, but very unlike any we have heretofore seen.

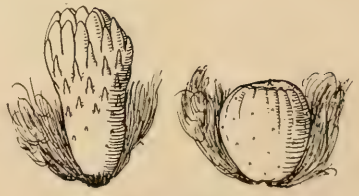


FIG. 89.—Flower of Espostoa lanata. ×0.7.
FIG. 90.—Fruit of same. ×0.7.

We have followed most recent writers in combining *Cereus dautwitzii* with *Cereus lanatus*, although we have not seen the type of either. We know, however, that *Cereus dautwitzii* came from Huancabamba, Peru, while *Cactus lanatus*, upon which *Cereus lanatus* was based, came from Guancabamba, Ecuador; the names, varying only in the initial letter, are different spellings for the same place. The northern boundary-line of Peru has pushed north since Humboldt visited this region; his station of Guancabamba is now in Peru instead of Ecuador.

The sweet, edible fruit is called soroco in southern Ecuador; it is also called piscol colorado, according to Humboldt.

FIG. 91.—Espostoa lanata.

The typical form was collected by J. N. Rose, A. Pachano, and George Rose in the Catamayo Valley, southern Ecuador, October 3, 1918 (No. 23326) and the other form was collected by Dr. and Mrs. Rose near Matucana, central Peru, altitude about 7,000 feet, July 9, 1914 (No. 18649). Dr. Rose also collected a living plant above Chosica (No. 18537) and herbarium specimens between Matucana and San Bartelome (No. 18748). Dr. W. H. Osgood has sent us photographs of a cactus which we would refer here. One was taken near Chilete, Peru, altitude 1,000 feet, and the other between Menocucho and Otuzco, Peru, altitude 3,000 feet.

Pilocereus haageanus (Monatsschr. Kakteenk. 6: 96. 1896) is sometimes referred to but was never published.

Illustrations: Dict. Gard. Nicholson 3: f. 152; Fl. Serr. 21: pl. 2163; Förster, Handb. Cact. ed. 2. f. 87; Gard. Chron. 1873: f. 1; Knippel, Kakteen pl. 29, all as *Pilocereus dautwitzii;* Cact. Journ. 2: 4, as *Pilocereus dautwitzii cristatus,* Monatsschr. Kakteenk. 21: 23; 24: 131, both as *Pilocereus lanatus;* Monatsschr. Kakteenk. 19: 183, as *Pilocereus lanatus cristatus;* Monatsschr. Kakteenk. 21: 23; 23: 125, both as *Pilocereus lanatus haagei.*

Figure 87 is from a photograph taken by George Rose in southern Ecuador in 1918; figure 88 is from a photograph taken by Dr. Rose at Matucana, Peru, in 1914; figure 89 shows the flower and figure 90 the fruit of the plant photographed by him; figure 91 is from a photograph taken at the New York Botanical Garden of the plant obtained by Dr. Rose at Chosica, Peru, in 1914.

5. BROWNINGIA gen. nov.

Plants solitary, with an upright trunk, branching only at top, the branches spreading or drooping; ribs numerous, low; young and sterile plants formidably spined; flowering branches naked or bearing only weak bristle-like spines; flowers solitary at the areoles, nocturnal, large, with slightly curved tubes; stamens and style shorter than the perianth-segments; flowers nearly white; ovary and flower-tube covered with large, thin, fleshy scales, these naked in their axils; fruit slightly acid, yellow, becoming naked by the falling away of the scales; seeds black, strongly papillose.

This genus does not closely approach any other. In the thin scales of the ovary and flower-tube there is a hint of *Escontria* of Mexico, but the scales are not chartaceous and the flowers are otherwise different. The ovary and perianth perhaps most resemble those of *Hylocereus.*

It is named in honor of W. E. Browning, formerly director of the Instituto Ingles at Santiago, Chile, who for many years did efficient educational work in Chile, and who was the friend of all Americans who visited Santiago.

1. Browningia candelaris (Meyen).

Cereus candelaris Meyen, Allg. Gartenz. 1: 211. 1833.

Stems 3 to 5 meters high, with a simple trunk sometimes 3 dm. in diameter at base, tapering gradually upward; trunk when young strongly armed with many long spines, but when very old shedding the spines and in some cases becoming nearly naked; ribs 30 to 34, rounded, about 5 mm. high; branches from and near the top usually many, sometimes as many as 50, but sometimes as few as 3 to 6, in whorls or pseudo-whorls, slender, often spreading at right angles to the trunk, sometimes erect, or sometimes drooping and even touching the ground; areoles circular, usually about 1 cm. apart, 5 to 15 mm. in diameter and, when old, much elevated; spines of the trunk-areoles normally about 20, very unequal, the longest ones 6 to 10 cm. long, but sometimes 50 or more, the longest 15 cm. long, at first brownish, then gray or black; spines on flowering branches weak, yellow, sometimes bristle-like or even wanting; flower-buds globular, obtuse, covered with thin imbricating scales; flowers opening in the evening, closing in early morning, not fragrant, 8 to 12 cm. long, a little curved; scales on ovary and flower-tube large, numerous; throat of flower rather narrow, 3 to 4 cm. long, covered with filaments; tube proper 4 cm. long; inner perianth-segments narrow, about 2 cm. long, brown or rose-colored or the innermost pale rose to white; filaments cream-colored, numerous, the lower 3 cm. long, the upper 2 cm. long; style slender, 7 cm. long, cream-colored; stigma-lobes about 12, 4 to 5 mm. long, cream-colored; fruit said to be edible; seeds 2 mm. broad.

Type locality: On mountain slopes along the way from Tacna, Chile, to Arequipa, Peru, up to 9,000 feet (2,740 meters) altitude.

Distribution: Southern Peru and northern Chile.

The name, *Cactus candelaris* Meyen (Reise 2: 40. 1835), occurs in Meyen's narrative, where he states that it was first found in the Cordilleras of Tacna (now in Chile) in isolated examples, confined between 7,000 and 9,000 feet altitude. This plant is very conspicuous in the desert below Arequipa and was collected there by Dr. Rose in 1914 (No. 18794).

Figure 92 shows a flower collected by Dr. Rose below Arequipa, Peru, in 1914; figure 93 shows the young fruit and persistent withering perianth from the same plant; figure 94 is from a photograph taken by T. A. Corry near Arequipa, Peru, in 1917; the plant immediately in front is *Trichocereus fascicularis*.

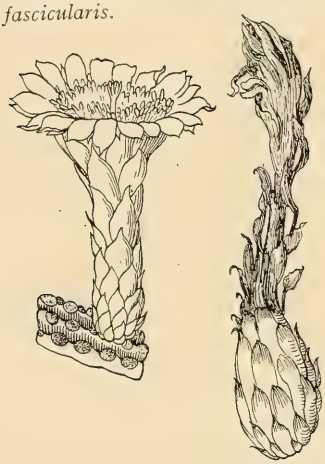


FIG. 92.—Flower of Browningia candelaris. ×0.6.
FIG. 93.—Young fruit of same. ×0.6.

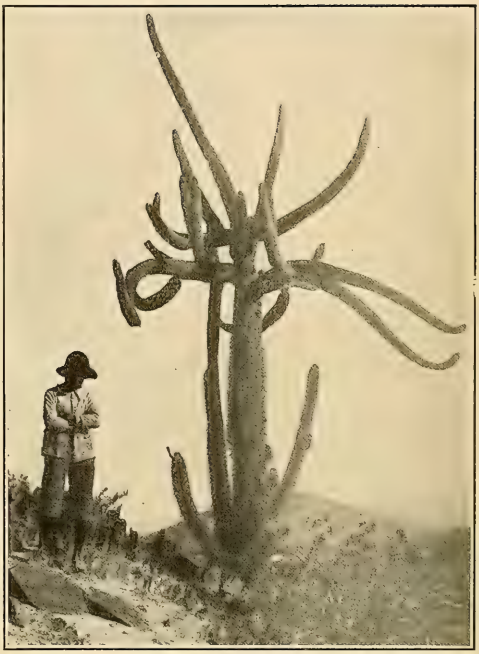


FIG. 94.—Browningia candelaris, with Trichocereus fascicularis immediately in front of it.

6. STETSONIA gen. nov.

A tall, erect, much branched cactus, with strongly ribbed branches, the areoles felted and bearing several unequal stiff subulate spines; flowers funnelform, large, solitary at upper areoles; ovary oblong-globose, densely covered by small, broad, erose, ciliate, abruptly subulate-tipped, membranous scales; flower-tube cylindric, somewhat expanded above, bearing distant scales similar to those of the ovary; outer perianth-segments broad, green, obtuse, the inner oblong-oblanceolate, spreading, acute; stamens numerous, not exserted; anthers large, oblong; style rather stout; stigma-lobes many, linear.

Only the following species is known to us, a conspicuous plant of the Argentine deserts. The genus is dedicated to Francis Lynde Stetson, of New York.

1. Stetsonia coryne (Salm-Dyck).

Cereus coryne Salm-Dyck,* Cact. Hort. Dyck. 1849. 205. 1850.

Plants large and massive, 5 to 8 meters high, with a thick, short trunk up to 4 dm. in diameter and 4 to 6 dm. long, and many (100 or more) ascending or upright elongated branches; ribs 8 or 9, 1 to 1.5 cm. high, obtuse, more or less crenate; spines 7 to 9, unequal, the longest 5 cm. long, subulate; flowers 12 to 15 cm. long; inner perianth-segments white, spreading; fruit not known.

Type locality: Not cited.
Distribution: Northwestern Argentina.
Although this species has long been known in collections, it is usually represented by very small specimens and has been poorly described.

*Both Weber and Schumann make Otto the author of this name. Salm-Dyck credits it to the Berlin Gardens.

A large plant of *Stetsonia coryne* in the desert of northern Argentina.

This tree-like cactus is native in the dry parts of northwestern Argentina, and occurs over a considerable area, growing with scattered shrubs and small trees on plains and low ridges. It is one of the most striking cacti in South America and often forms the dominant feature of the landscape on the high plains of northern Argentina.

In 1917, Dr. Shafer collected living specimens and flowers in Santiago del Estero, Argentina, which have enabled us to redescribe the species. Flowers were also collected by Wilhelm Bodenbender in 1905, but these were not accompanied by stems and were not at first associated with this species.

Illustrations: Monatsschr. Kakteenk. 3: 177; 13: 187; Schelle, Handb. Kakteenk. f. 17; Rev. Hort. Belge 40: after 184, as *Cereus coryne*.

FIG. 95.—Flower of S. coryne. ×0.6.

FIG. 96.—Stetsonia coryne.

Plate IX is from a photograph contributed by Dr. Spegazzini. Figure 96 is from a photograph of flowering branches taken by Dr. Shafer at Santiago del Estero, Argentina, in 1917; figure 95 shows the flower of one of these branches.

7. ESCONTRIA Rose, Contr. U. S. Nat. Herb. 10: 125. 1906.

Large and much branched plants; ribs few; spines all similar, arranged in peculiar pectinate clusters; flowers small, yellow, somewhat campanulate, one at an areole, diurnal; ovary globular, covered with imbricated chartaceous, translucent, persistent scales, their axils without spines or hairs; inner perianth-segments erect, narrow; stamens and style included; fruit globular, scaly, purple, fleshy, edible; seeds numerous, black, rugose, with a flattened, broad, basal hilum.

Type species: *Cereus chiotilla* Weber.

Only 1 species is definitely known. The genus commemorates Señor Don Blas Escontria, a distinguished Mexican, who died in 1906.

1. Escontria chiotilla (Weber) Rose, Contr. U. S. Nat. Herb. 10: 126. 1906.

Cereus chiotilla Weber in Schumann, Gesamtb. Kakteen 83. 1897.

Plant 4 to 7 meters high; trunk very short; branches numerous, forming a compact top, weak and easily broken, bright green, not at all glaucous; ribs 7 or 8, acute; areoles close together, often confluent, elliptic; radial spines 10 to 15, rather short, often reflexed; central spines several, one much

longer than the others, somewhat flattened, sometimes 7 cm. long, all light colored; flowers borne near the ends of the branches, including the ovary about 3 cm. long; inner perianth-segments yellow, acuminate; scales on ovary and flower-tube arranged in many overlapping series, ovate, 8 to 15 mm. long; fruit glabrous, about 5 cm. in diameter, scaly, edible.

Type-locality: Mexico.

Distribution: Southern Mexico.

The ripe fruit is sold in the market at Tehuacán under the name of geotilla or chiotilla and tuna. Dr. H. H. Rusby reports that the dried fruit, which tastes like gooseberries, is also sold in the markets.

This species was collected by Dr. A. Weber while connected with the French army in Mexico. Material was sent to Dr. Engelmann in 1864, but it was not described by him.

Illustrations: Bull. Soc. Acclim. France **52**: f. 5; Möllers Deutsche Gärt. Zeit.**29** : 445, as *Cereus chiotilla*; Contr. U. S. Nat. Herb. **10**: pl. 43, f. A; **12**: pl. 65.

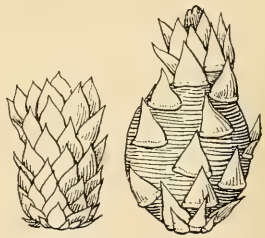


FIG. 97.—Flower of Escontria chiotilla. ×0.7.
FIG. 98.—Fruit of same. ×0.7.

Plate X is from a photograph taken by Dr. MacDougal at Tomellín, Mexico, in 1906. Figure 97 shows a flower and figure 98 a fruit collected in 1905 by Dr. Rose near Tehuacán.

8. CORRYOCACTUS gen. nov.

Stems columnar, usually very short, branching from the base, the branches stiff, more or less erect, strongly ribbed; areoles very spiny; flowers diurnal (?), rather large, with a broad, open throat, the tube proper very short; perianth-segments yellow or orange; filaments numerous, stiff, short, scattered all over the throat, much shorter than the segments; style short and stiff, with numerous stigma-lobes; ovary and flower-tube bearing numerous conspicuous areoles with brown or black wool and subtended by minute scales; fruit juicy, globular, covered with clusters of deciduous acicular spines; seeds small.

Type species: *Cereus brevistylus* Schumann.

A genus of three known species of similar habit and flowers, natives of Peru and Bolivia. The flowers have very short tubes, but are quite different from those of *Eulychnia*, to which Berger referred the only species he knew.

While the species are similar in a general way, they are individually different in habit, armament, and in shades of color and size of the flowers; their ranges do not overlap, as they are found in different regions and at different altitudes. One of them occurs in the coastal mountains of southern Peru, altitude 550 meters; one in the foothills of the Andes proper, altitude 2,300 meters; and one in the great valley of the Andes in Bolivia, altitude 3,650 meters.

The genus is named for T. A. Corry, chief engineer of the Ferrocarril del Sur of the Peruvian Corporation, who much facilitated our exploration of this region. It is rather remarkable that all three of these species are found along this very interesting railroad, which extends from the sea-level to an altitude of 16,000 feet.

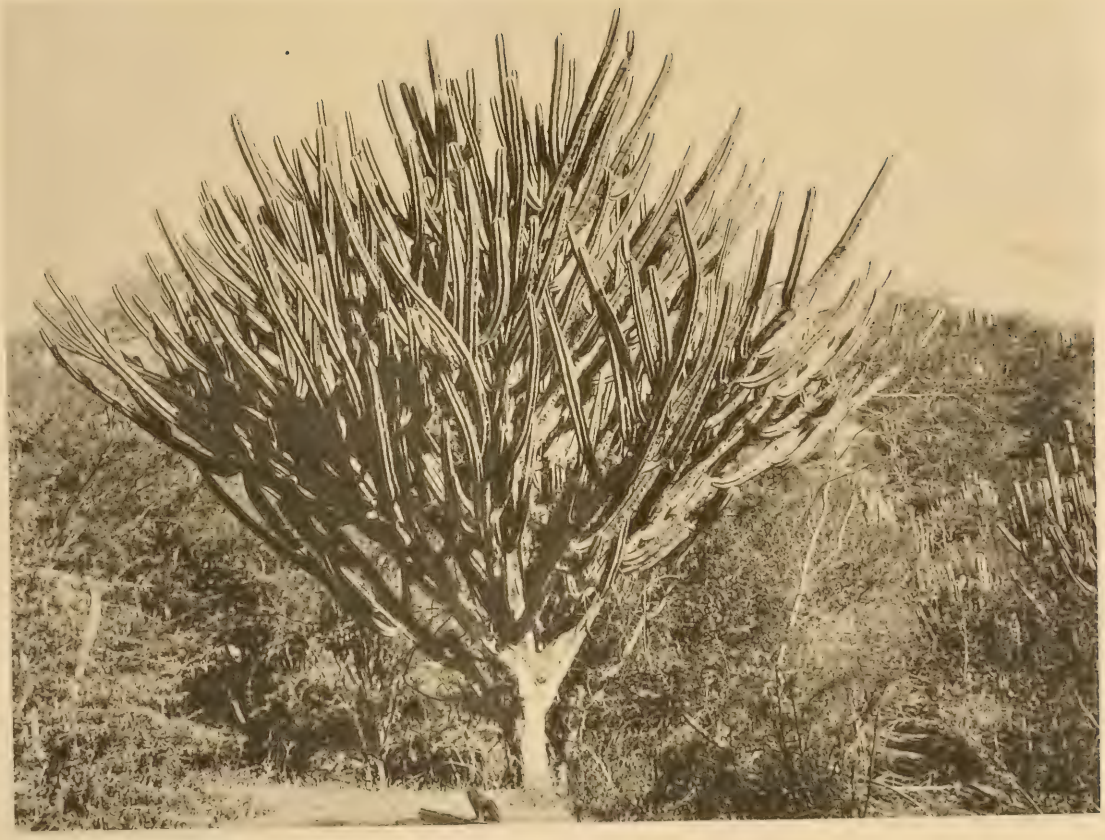
KEY TO SPECIES.

Flowers very broad, 10 cm. wide, yellow ..... 1. *C. brevistylus*
Flowers much narrower than the last, 4 to 7 cm. broad.
  Inner perianth-segments orange; longest spines 10 to 16 cm. long ..... 2. *C. brachypetalus*
  Inner perianth-segments yellow; longest spines 5 to 7 cm. long ..... 3. *C. melanotrichus*

1. Corryocactus brevistylus (Schumann).

Cereus brevistylus Schumann in Vaupel, Bot. Jahrb. Engler **50**: Beibl. 111: 17. 1913.

Plants 2 to 3 meters high, usually much branched from the base, often forming large clumps, light green to almost yellow; ribs few, 6 or 7, very prominent; areoles 3 cm. apart, large, circular and elevated, with short, dense wool and spines; spines about 15, at first brownish, very unequal,



A plant of *Escontria chiotilla*, near Tehuacán, Mexico.

some less than 1 cm. long, some about 3 cm. long, and still others 20 to 24 cm. long; flower broadly funnelform, constricted just above the ovary, 9 cm. long, 10 cm. broad when fully expanded; throat 4.5 cm. broad at the top; perianth-segments bright yellow, oblong, spreading; filaments numerous, yellow; style short, thick, white, with numerous, slender, white stigma-lobes; scales of the ovary and flower-tube small, with brown wool, white bristles, and short spines; fruit globular, juicy, covered with numerous spine-clusters, these tardily deciduous.

Type locality: Yura, near Arequipa, Peru.

Distribution: In the mountains of southern Peru, altitude 2,000 to 3,300 meters.

This species is one of the three or four common cacti found on the hills and in the valleys both above and below Arequipa, and, while not the largest, is often the most abundant and conspicuous. Dr. Rose studied this plant in Peru in 1914, collecting living and herbarium specimens, including the very long spines described above (Nos. 18780, 18965).

Figure 99 is from a photograph taken near Arequipa, Peru, by T. A. Corry in 1917; figure 101 represents a flower collected by Dr. Rose near the same place in 1914.

FIG. 99.—Corryocactus brevistylus.

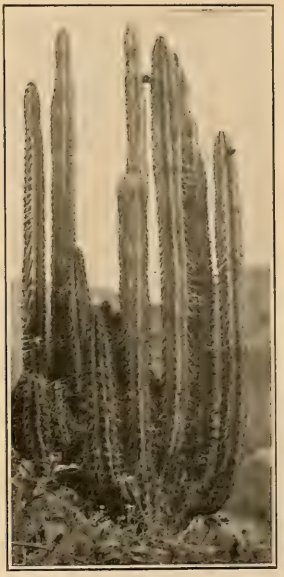


FIG. 100.—Corryocactus brachypetalus.

2. Corryocactus brachypetalus (Vaupel).

Cereus brachypetalus Vaupel, Bot. Jahrb. Engler 50: Beibl. 111: 16. 1913.

Plant 2 to 4 meters high, usually with many (sometimes 100 or more) strict branches from the base, forming a top 3 to 4 meters in diameter; ribs usually 7 or 8, somewhat prominent; areoles usually 2 cm. apart, large, 1 cm. in diameter or less, with short wool and spines; spines at first black with brown bases, about 20 at an areole, very unequal, most of them less than 1 cm. long, the longest ones 10 to 16 cm. long; flowers broadly funnelform, 4 to 6 cm. broad; throat 2 to 3 cm. broad at top; inner perianth-segments deep orange, 1 to 1.5 cm. long, the outer ones apiculate, the inner ones obtuse or truncate; filaments very short, 5 to 8 mm. long, yellow; style, including the slender stigma-lobes, 2 cm. long; areoles of the ovary and flower small, filled with black and white wool and nascent spines; fruit globular, 6 to 7 cm. in diameter, greenish yellow, covered with clusters of deciduous spines, juicy, said to be edible; seeds dull in color, 1.5 mm. long.

Type locality: Rocky sandy bottoms near Mollendo, southern Peru.

Distribution: Foothills of southern Peru, altitude 600 meters.

This plant is very abundant in the foothills of southern Peru. In many places it is the only conspicuous plant in this arid region, which in the dry season is otherwise almost devoid of plant life. In the shelter of these plants thousands of lizards live and, doubtless, feed upon the flowers. Dr. Rose collected the species in 1914 (No. 18810) at Posco, Peru, not far from the type locality.

FIG. 101.—Flower of C. brevistylus. ×0.7.

FIG. 102.—Flower of C. brachypetalus. ×0.7.

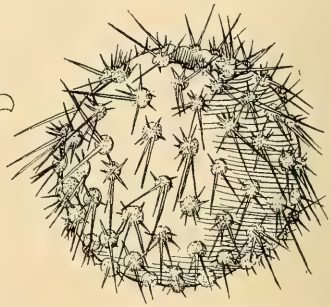


FIG. 103.—Fruit of Corryocactus brachypetalus. ×0.7.

Figure 102 represents a flower and figure 103 a fruit, collected by Dr. Rose at Posco, Peru, in 1914; figure 100 is from a photograph taken near Posco, Peru, by T. A. Corry in 1918.

3. Corryocactus melanotrichus (Schumann).

Cereus melanotrichus Schumann, Gesamtb. Kakteen 71. 1897.*

Plant 1 to 2 meters high, forming small clumps with erect slender branches 3 to 4 cm. in diameter; ribs 7 or 8, much lower than in the other species; areoles 1 to 1.5 cm. apart, black or nearly so; spines 7 to 15, light yellow, subulate, somewhat unequal, the longest ones 5 to 7 cm. long; flowers broadly funnelform, 6 to 8 cm. long, 5 to 7 cm. broad; perianth-segments yellow; filaments much longer than in the other species; areoles of the flower with 1 to 5 long, black, bristle-like spines; fruit globular, 5 to 6 cm. in diameter, very juicy, covered with clusters of small acicular spines.

Type locality: Near La Paz, Bolivia.

Distribution: Central Bolivia, altitude 3,300 meters.

Plants of this species are much smaller than those of the other two and often form low thickets, growing on the barren hills in and about La Paz. The species was re-collected by Dr. Rose in 1914 (No. 18843).

9. PACHYCEREUS (Berger) Britton and Rose, Contr. U. S. Nat. Herb. **12**: 420. 1909.

Usually very large plants, more or less branched, with definite trunks, the stems and branches stout, columnar, ribbed; flowers diurnal, with rather short tubes; outer perianth-segments short, spatulate; stamens included, numerous, inserted along the throat; style included; ovary and flower-tube covered with small scales bearing felt and bristles in their axils; fruit large, bur-like, dry, usually densely covered with clusters of deciduous spines and bristles; seeds large and black.

Type species: *Cereus pringlei* S. Watson.

We recognize 10 species, all natives of Mexico, from northern Sonora to Yucatan. The name was first used by Berger as a subgenus of *Cereus* (Rep. Mo. Bot. Gard. **16**: 63. 1905); we agree with his limitation of the group, except by excluding *Cereus thurberi* Engelmann,

*This name occurred in print two years earlier, but without description, in the Memoirs Torrey Botanical Club (4: 207).

referred by us to *Lemaireocereus*, and by including *Cereus marginatus* De Candolle, placed by him in his subgenus *Stenocereus*.

The name *Pachycereus* is from the Greek and means thick-cereus, referring to the stout stems and branches.

Key to Species.

A. Scales of ovary and perianth-tube fleshy or herbaceous.
Wool of ovary-areoles copious, mostly longer than the scales.
Perianth-tube broad; branches many-ribbed.
Areoles of ovary and perianth-tube densely felted, but without long wool.
Joints green or but slightly glaucous.
All areoles of the perianth-tube densely felted, the scales short.
Spines brown to gray or sometimes black ..... 1. *P. pringlei*
Spines of young growth yellowish brown ..... 2. *P. orcuttii*
Upper areoles of perianth-tube little or scarcely felted, scales long.
Flowering areoles bearing many short, weak spines ..... 3. *P. pecten-aboriginum*
Flowering areoles bearing several acicular stiff spines ..... 4. *P. gaumeri*
Young growth glaucous, the bloom persistent as whitish streaks ..... 5. *P. grandis*
Areoles of ovary and perianth-tube bearing copious yellow-brown wool 1.5 to 2.5 cm. long ..... 6. *P. chrysomallus*
Perianth-tube narrow; branches 5 to 7-angled ..... 7. *P. marginatus*
Wool of ovary-areoles sparse, shorter than the coriaceous scales ..... 8. *P. ruficeps*
AA. Scales of ovary and perianth-tube dry ..... 9. *P. lepidanthus*
AAA. Species not grouped ..... 10. *P. columna-trajani*

1. Pachycereus pringlei (S. Watson) Britton and Rose, Contr. U. S. Nat. Herb. **12**: 422. 1909.

Cereus pringlei S. Watson, Proc. Amer. Acad. **20**: 368. 1885.
Cereus calvus Engelmann in Coulter, Contr. U. S. Nat. Herb. **3**: 409. 1896.
Cereus titan Engelmann in Coulter, Contr. U. S. Nat. Herb. **3**: 409. 1896.
Pilocereus pringlei Weber, Dict. Hort. Bois 966. 1898, name only.
Pachycereus calvus Britton and Rose, Contr. U. S. Nat. Herb. **12**: 420. 1909.
Pachycereus titan Britton and Rose, Contr. U. S. Nat. Herb. **12**: 422. 1909.

Tree-like, up to 11 meters high, usually with a very short, thick trunk, sometimes 1 or even 2 meters long or more, often 6 dm. but sometimes 2 meters in diameter or more, very woody and in age naked; stem sometimes nearly simple but often with numerous, thick, upright branches, more or less glaucous, very spiny or in some forms nearly naked; ribs usually 11 to 15 but sometimes 17, obtuse; areoles, especially the flowering ones, very large, brown-felted, usually confluent or connected by a groove; spines variable as to length, abundance, and structure, usually more formidable in young plants than in old plants, often wanting in very old plants; spines on young growth 20 or more at an areole, 1 to 2 cm. long, white but with black tips, or on young plants sometimes 12 cm. long and black throughout; flower-bearing region of the branches extending from near the top downward sometimes for 2 meters, the areoles becoming broad and uniting, often spineless; flower-buds greenish; flowers 6 to 8 cm. long, the tube and ovary bearing small, acute scales, these nearly hidden by the mass of brown hairs produced in their axils; inner perianth-segments white, broad, spreading; fruit globular, covered with brown felt and bristles, dry; seeds large, edible.

Fig. 104.—Pachycereus pringlei.

Type locality: South of the Altar River, Sonora, Mexico.

Distribution: Sonora and Lower California.

This is a very interesting and important cactus in northwestern Mexico, often the dominant plant in the landscape. On the plain about Guaymas solitary plants, giants of the race, are seen, which are doubtless remnants of great forests which once covered this plain. In Lower California protected valleys and hillsides are now covered with forests made up almost entirely of this species. The natives call these plants cardon. They gather the wood for firewood and use it to make walking-canes, or in building their simple houses, especially for rafters and beams; the Yaquí Indians, especially, gather the seeds and make a kind of flour by crushing them, and this is made into tomales. It is common in western Sonora, on many of the islands in the Gulf of California, all along the east coast of Lower California, and along the west coast of Lower California as far north as Magdalena Bay. In this distribution we have included the two species *Cereus calvus* and *C. titan*, both of which were described from spine-clusters. They may or may not be specifically distinct from *P. pringlei*, but without further data it is best to refer them here.

Illustrations: Gard. and For. **2**: f. 92; Monatsschr. Kakteenk. **18**: 119; Rep. Mo. Bot. Gard. **16**: pl. 1, f. 1 to 4; Schumann, Gesamtb. Kakteen f. 13; Schelle, Handb. Kakteenk. f. 19; MacDougal, Bot. N. Amer. Des. pl. 12, 13; Rep. U. S. Nat. Mus. **1897**: pl. 6, as *Cereus pringlei;* Contr. U. S. Nat. Herb. **16**: pl. 130; Stand. Cycl. Hort. Bailey **5**: f. 2695.

Figure 104 is from a photograph taken at Magdalena Bay, Lower California.

2. **Pachycereus orcuttii** (K. Brandegee) Britton and Rose, Contr. U. S. Nat. Herb. **12**: 422. 1909.

Cereus orcuttii K. Brandegee, Zoe **5**: 3. 1900.

"Stems erect, branching, bright green, reaching a height of 3 meters and a diameter of 15 cm., with hard woody center; ribs 14 to 18, about 1 cm. high; areoles round, about 6 mm. in diameter and about half that distance apart, densely covered with short, light gray wool; spines all slender, spreading, yellowish brown, irregularly 3-seriate; radials 12 to 20, about 12 mm. long, deficient above; intermediates about 10, one-third to more than twice as long, less spreading, one of the upper spines of this row usually stouter and darker, porrect, often reaching a length of 7 cm.; centrals about 5, porrect, spreading a little longer than the intermediates; flowers greenish brown, darker outside, diurnal, entire length about 4 cm.; petals short-apiculate; ovary densely covered with short scales, almost completely concealed by thick, rounded tufts of yellowish wool, in which are imbedded dark brown bristles 4 to 6 cm. long; stamens lining the upper half of the tube; style tips acute; fruit not known.

"The plant from which this description is drawn was obtained by Mr. C. R. Orcutt near Rosario, Baja California, in May 1886. It was brought to him by his guide, who found it off the trail some little distance. The cutting was planted in Mr. Orcutt's garden, and is now about 2 meters in height; has flowered but has formed no fruit. It is much the finest of the large *Cerei* of Baja California, being densely covered with bright yellow-brown spines."

Type locality: Rosario, Lower California.

Distribution: Known only from the type locality.

The above description and account are taken from Mrs. Brandegee's article in Zoe, June 1900. Dr. Rose saw the type plant in 1908 at San Diego, California, and at that time obtained a flower and bud from Mr. Orcutt. Afterwards Mr. Orcutt photographed the plant and a flower and sold the prints. The photograph has also been printed on cardboard and distributed in an advertisement for Orcutt's American plants. A set of these photographs is in the National Herbarium.

3. **Pachycereus pecten-aboriginum** (Engelmann) Britton and Rose, Contr. U. S. Nat. Herb. **12**: 422. 1909.

Cereus pecten-aboriginum Engelmann in S. Watson, Proc. Amer. Acad. **21**: 429. 1886.

Tree-like, 5 to 10 meters high, with a trunk 1 to 2 meters high and 3 dm. in diameter, crowned with many erect branches; ribs 10 or 11; areoles 1 cm. in diameter or even less, extending downward in narrow grooves, in the flowering ones forming brownish cushions connecting with the areoles

below, densely tomentose (grayish except in flowering ones, which are brownish or reddish); spines 8 to 12, 1 to 3 central, all short, usually 1 cm. long or less, but in some cases 3 cm. long, grayish with black tips; flowering areoles not much larger than the others; flowers 5 to 7.5 cm. long; ovary covered with dense soft hairs with only a few bristles or none; outer perianth-segments purple, succulent; inner ones white, fleshy; stamens very numerous; style with 10 linear stigma-lobes; fruit 6 to 7.5 cm. in diameter, dry, covered with yellow wool and long yellow bristles.

Type locality: Hacienda San Miguel, Chihuahua, Mexico.

Distribution: Chihuahua, Sonora, Colima, and Lower California.

Illustrations: Contr. U. S. Nat. Herb. 5: f. 32; pl. 57, 58; Gard. and For. 7: f. 54; Dict. Gard. Nicholson Suppl. f. 233, all as *Cereus pecten-aboriginum.*

Figures 105 and 106 are copied from the two plates first cited above.

FIG. 105.—Pachycereus pecten-aboriginum.

4. **Pachycereus** (?) **gaumeri** sp. nov.

Plant slender, 2 to 7 meters high, erect, simple or few-branched; branches 4-angled or winged; ribs thin, 3 to 4 cm. high; areoles large, 1 to 2.5 cm. apart, brown-felted; spines several, slender, 1 to 3 cm. long, brownish; flowers yellowish green, 5 cm. long; scales of the ovary and flower-tube more or less foliaceous, drying black and thin, with brown felt in the areoles; scales on the ovary linear, puberulent; fruit not known.

This species is based on two collections, both made in Yucatan by George F. Gaumer, as follows: No. 23778 at Hodo, April 1917 (type), No. 648 at Port Silam, 1895. Dr. Gaumer writes of these numbers as follows:

"As to my No. 23778 I sent many fine specimens of flowers and several cross-sections of a moderately large plant to Dr. Millspaugh. It grows erect, has few branches, many flowers on each plant; it is very common at the senote Hodo where the most of the plants range from 6 to 10 ft. high; it is a delicate-looking Cactus of a light pea-green color, quite showy, the flowers are of a light green tinged with cream-color, they do not open out much but remain almost cylindrical. Living specimens were sent to Dr. Britton at Bronx Park. It blooms in May and is found about four leagues east of Izamal.

"648 was taken by myself at the port of Silam in 1894 and sent to Dr. Millspaugh. Only two plants were seen; one was about 10 ft. and the other 20 ft. high. It grows erect and the larger plant had but one branch. My son Geo. J. has failed to find it in the region of Progresso."

Since the above description was written, Dr. Gaumer has sent another plant (No. 23935) which we believe belongs here, although it differs somewhat from the other plants. A cutting was sent to the New York Botanical Garden which produced a bud in the spring of 1919, but this only partially developed. This plant may be described as follows:

Erect; ribs 5 to 7, separated by broad intervals; areoles 1 cm. apart; spines about 15, 2 to 3 cm. long, weak, gray in age; flower-bud acute, ovoid, covered with green imbricating scales.

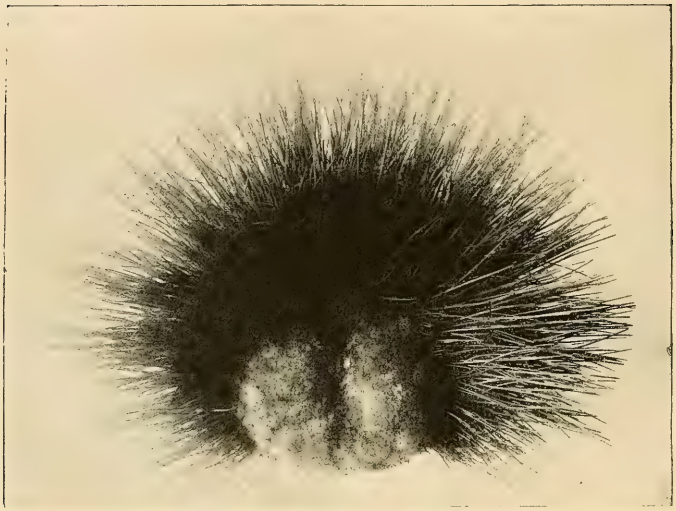


FIG. 106.—Fruit of Pachycereus pecten-aboriginum.

5. **Pachycereus grandis** Rose, Contr. U. S. Nat. Herb. **12**: 421. 1909.

Cereus bergerianus Vaupel, Monatsschr. Kakteenk. **23**: 24. 1913.

Plant 6 to 10 meters high, either simple or much branched, the trunk sometimes a meter in diameter; branches, when present, columnar, generally simple, becoming erect almost from the first, with numerous constrictions, pale green, or when young glaucous, with some bloom which persists in streaks; ribs 9 to 11, acutish, high; sterile areoles circular, large, bearing white felt and subulate spines, 2 to 3 cm. apart, not running together, not extending below the spines as in *P. pecten-aboriginum;* old spines grayish to white with black tips; radial spines 9 or 10; central spines 3, the lower one longer, sometimes 6 cm. long, somewhat flattened; flowering areoles large, elliptic, bearing acicular or bristle-like spines; flowers rather small for the genus, about 4 cm. long; ovary and flower-tube bearing small, acuminate scales, their axils filled with downy hairs; fruit large, globular, dry, covered with long yellow bristles and yellow felt.

Type locality: On the pedregal near Cuernavaca, Mexico.

Distribution: Common in the State of Morelos, Mexico.

This plant is very common on the pedregal north of Cuernavaca, where it was first observed by Dr. Rose in 1906 (No. 11087), and is frequent on the hills south of Cuernavaca. Mr. Dowell, the cactus dealer in Mexico City, told Dr. Rose that he had exported plants to Europe, but whether they are now in the trade we do not know. A living specimen sent back by Dr. Rose has since been growing in the Washington Botanical Garden.

6. **Pachycereus chrysomallus** (Lemaire) Britton and Rose, Contr. U. S. Nat. Herb. **12**: 421. 1909.

Pilocereus chrysomallus Lemaire, Fl. Serr. **3**: under pl. 242. 1847.
Cereus chrysomallus Hemsley, Biol. Centr. Amer. Bot. **1**: 541. 1880.
Cephalocereus chrysomallus Schumann in Engler and Prantl, Pflanzenfam. **3**[6a]: 182. 1894.
Pilocereus fulviceps Weber in Schumann, Gesamtb. Kakteen 176. 1897.
Cereus fulviceps Berger, Rep. Mo. Bot. Gard. **16**: 64. 1905.

Stem columnar, massive, at first simple, but in very old plants much branched, giving off hundreds of erect branches which form an almost compact cylinder up to 5 meters in diameter, becoming 12 to 18 meters high; branches glaucous green, 11 to 14-ribbed; flowering branches capped

M. E. Eaton del

Top of flowering plant of *Pachycereus chrysomallus*.
(Natural size.)

by dense masses of brownish wool; areoles approximate or even confluent; radial spines about 12, slender; centrals 3, 1 very long, sometimes 12 to 13 cm. long; flowers borne near the tops of the stems or branches, 6 to 7 cm. long; the bud, afterwards the flower, and finally the fruit, completely concealed in the long wool; ovary covered with small, pale, imbricated scales; flower-tube also covered with imbricated scales, but these larger and pinkish, pointed; flowers doubtless opening at night, but still expanded at 8 o'clock in the morning; tube proper 10 mm. long or less; throat funnelform, 3 cm. long; inner perianth-segments numerous, 1.5 to 3 cm. long, cream-colored; inner perianth-segments and stamens inflexed after anthesis, with the stiff outer perianth-segments pressed down upon them; stamens attached all over the throat, the innermost and lower row united at base and appressed against the style; filaments cream-colored; style stout, stiff, 7.5 cm. long, cream-colored; stigma-lobes linear, erect, cream-colored.

FIG. 107.—Pachycereus chrysomallus.

Type locality: Mexico.

Distribution: Puebla and Oaxaca, Mexico.

This is one of the characteristic plants on the mesas around Tehuacán. When fully grown, it is a very large plant with many upright branches; the trunk and old branches are stout and woody, making it very difficult to obtain botanical specimens. In 1906 Dr. MacDougal and Dr. Rose shipped a very large plant to the New York Botanical Garden, which flowers annually and from which an abundance of flowers has been obtained.

Cereus militaris Audot (Rev. Hort. II. 4: 307. 1845) and *Pilocereus militaris* (Salm-Dyck, Cact. Hort. Dyck. 1849. 40. 1850, as synonym) probably belong here.

Illustrations: Contr. U. S. Nat. Herb. 10: pl. 18; MacDougal, Bot. N. Amer. Des. pl. 16; Nat. Geogr. Mag. 21: 699, as *Pilocereus fulviceps;* Contr. U. S. Nat. Herb. 12: pl. 66.

Plate XI illustrates the top of a flowering plant in the New York Botanical Garden brought from Tehuacán, Mexico, by Dr. MacDougal and Dr. Rose in 1906. Figure 107 is from a photograph taken by Dr. Rose near Tehuacán, in 1906; figure 108 shows the flower of this plant; and figure 109 a longitudinal section of the flower.

7. **Pachycereus marginatus** (De Candolle) Britton and Rose, Contr. U. S. Nat. Herb. **12**: 421. 1909.

Cereus marginatus De Candolle, Mém. Mus. Hist. Nat. Paris **17**: 116. 1828.
Cereus gemmatus Zuccarini in Pfeiffer, Enum. Cact. 96. 1837.

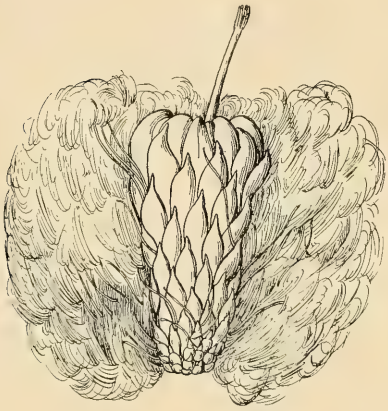


FIG. 108.—Flower of P. chrysomallus. ×0.7.

FIG. 109.—Longitudinal section of flower of P. chrysomallus. ×0.7.

Stems 3 to 7 meters high, erect, usually simple; ribs 5 or 6 (7 in the original specimen), somewhat acute when young, obtuse in age; areoles close together, usually confluent, their wool forming a dense white cushion along the ridge of each rib; spines at first 5 to 8 (1 central), in old areoles more numerous, 1 cm. long or less, but in flowering areoles often numerous, bristly and 2 cm. long; flowers and fruit usually closely set, one above the other, apparently only one at an areole, but recorded as often geminate, and appearing anywhere along the ribs from the top downward; flower funnelform, 3 to 4 cm. long including the ovary; tube and ovary more or less scurfy and with ovate scales subtending bunches of wool and small spines; fruit globular, about 4 cm. in diameter, not very fleshy, yellowish red within, covered with spines and wool which finally drop off; seeds numerous, black, and somewhat shining, rather large, 4 mm. long, the hilum depressed.

Type locality: Mexico.

Distribution: Hidalgo, Querétaro, and Guanajuato, and widely planted and naturalized throughout Mexico.

This species is commonly cultivated throughout central and southern Mexico as a hedge plant and when properly cared for forms an impenetrable barrier; it is there called organo.

Cereus cupulatus, *Cereus incrustatus*, and *Cereus mirbelii* are all referred by Pfeiffer (Enum. Cact. 97. 1837) to this species. *Cereus incrustans* Steudel (Nom. ed. 2. **1**: 334. 1840) was only a garden name but was referred to this species by Steudel.

FIG. 110.—Flower of P. marginatus. Natural size.

Illustrations: Contr. U. S. Nat. Herb. **5**: pl. 59, 60; Bull. Soc. Acclim. France **52**: f. 8; Monatsschr. Kakteenk. **19**: 62; Reiche, Veg. Alred. Cap. Mex. f. 21, 22; Schumann, Gesamtb. Kakteen f. 17; U. S. Dept. Agr. Bur. Pl. Ind. Bull. **262**: pl. 6; Journ, Intern. Gard. Club **3**: 18, all as *Cereus marginatus;* Monatsschr. Kakteenk. **23**: 149, as *Cereus marginatus gibbosus;* Cact. Journ. **1**: 59; **2**: 169, as *Cereus gemmatus;* Schelle, Handb. Kakteenk. f. 22, as *C. marginatus gemmatus*.

Figure 110 shows a flower drawn from an herbarium specimen collected by Edward Palmer at San Luis Potosí, Mexico, in 1905; figure 111 is from a photograph of the plant used as a hedge near the City of Mexico.

FIG. 111.—Pachycereus marginatus used as a hedge plant in Mexico.

8. Pachycereus ruficeps (Weber).

Pilocereus ruficeps Weber in Gosselin, Bull. Mus. Hist. Nat. Paris 11: 509. 1905.
Cereus ruficeps Vaupel, Monatsschr. Kakteenk. 23: 27. 1913.

Stout, columnar, 15 meters high, from a simple trunk, 3 to 4 dm. in diameter, but branched above; branches erect; ribs about 26; young spines all reddish; radial spines 8 to 10, about 1 cm. long, rigid, grayish; central spines 1 to 3, the longest 4 to 5 cm. long, porrect or deflexed; flowers at the top of the plant, campanulate, 5 cm. long, the ovary and tube bearing small chartaceous scales, these with small tufts of felt and a few yellow bristles in their axils; stamens numerous, arranged in 2 series; style stout, light flesh-colored; stigma-lobes 7 to 9; fruit small, not edible; seeds small, brownish, shining.

Type locality: Near Tehuacán, Mexico.

Distribution: Oaxaca, Mexico.

This species has been described rather fully by Roland-Gosselin, but we are still in some doubt as to its relationship.

Dr. Rose collected flowers of it in 1905, but these were confused with specimens of *Cephalocereus macrocephalus*, which seems to indicate that the two species grow together.

When Dr. Rose was at the Museum of Paris in 1912 he was given a flower from the type collection made by M. Diguet.

Illustration: Bull. Soc. Acclim. France 52: 58. f. 17, as *Cereus ruficeps*.

9. Pachycereus lepidanthus (Eichlam).

Cereus lepidanthus Eichlam, Monatsschr. Kakteenk. **19**: 177. 1909.

Stems simple or with few stout branches, light green; ribs 7 to 9, rather low, separated by broad, rounded intervals; areoles about 1 cm. apart, small; radial spines about 10, slender, 1.5 cm. long or the longer ones 4 cm. long; the central ones stouter and somewhat flattened, 3 to 6 cm. long; flowers 7 cm. long, 2.5. cm. broad; perianth-segments arranged in 3 or 4 series, 2.5 cm. long, 8 mm. broad, below red, above sepia-brown, persisting on the fruit; ovary and flower-tube covered with membranous scales; fruit dry.

Type locality: Rancho San Agustin, Guatemala.

Distribution: Guatemala.

This plant resembles *Escontria chiotilla*, with which we at one time thought it was related, but it has very different areoles on the stems, while the areoles in the axils of the fruit scales, instead of being naked, are described as bearing felt and bristles, and the fruit as dry instead of juicy. We have studied living specimens of the plant both in the New York Botanical Garden and in the Cactus House at Washington, but none of these has flowered, and we know its flowers and fruits only from Eichlam's description above cited.

Illustration: Monatsschr. Kakteenk. **23**: 53, as *Cereus lepidanthus*.

10. Pachycereus columna-trajani (Karwinsky) Britton and Rose, Contr. U. S. Nat. Herb. **12**: 421. 1909.

Cereus columna-trajani Karwinsky in Pfeiffer, Enum. Cact. 76. 1837.
Cephalophorus columna-trajani Lemaire, Cact. Aliq. Nov. xii. 1838.
Pilocereus columna Lemaire, Cact. Gen. Nov. Sp. 9. 1839.
Pilocereus lateribarbatus Pfeiffer in Förster, Handb. Cact. ed. 2. 672. 1885.
Cephalocereus columna Schumann in Engler and Prantl, Pflanzenfam. 3^{6a}: 182. 1894.
Pilocereus columna-trajani Schumann, Gesamtb. Kakteen 198. 1897, as synonym.

Plants erect, stout, up to 15 meters high, 4.5 to 5 dm. in diameter, often simple; ribs many, green; areoles oblong, bearing brown felt; radial spines 8 to 10, 12 to 25 mm. long; central spines more elongated, sometimes 16 cm. long, deflexed; spines all rigid, white or horn-colored except the brown bases and tips, sometimes said to be soft and erect; flowers described as purple.

Type locality: San Sebastian, Puebla, Mexico.

Distribution: Puebla and Oaxaca, Mexico.

In 1906, Dr. Rose collected in the Tomellín Canyon in southern Mexico, not far from the type locality of this species, what appeared to him to be this species. It forms forests which cover the surrounding hills, but, unfortunately, no flowers or fruit could be procured.

Melocactus columna-trajani (Pfeiffer, Enum. Cact. 46. 1837) is usually referred to this species, but is not formally published at the place here cited.

Cereus lateribarbatus (Rev. Hort. **1862**: 427. 1862) belongs here, according to Lemaire.

Illustrations: Blanc, Cacti 77. f. 1715; Rev. Hort. **62**: 129. f. 40, as *Pilocereus columna-trajani;* Möllers Deutsche Gärt. Zeit. **29**: 354. f. 9; MacDougal, Bot. N. Amer. Des. pl. 22, as *Pilocereus tetetzo;* Schelle, Handb. Kakteenk. f. 43, as *Cephalocereus columna-trajani.*

Plate XII is from a photograph taken by Dr. MacDougal at Tomellín Canyon, Mexico.

Cereus tetazo Coulter (Contr. U. S. Nat. Herb. **3**: 409. 1896; *Pilocereus tetetzo* Weber in Schumann, Gesamtb. Kakteen 175. 1897), which we first confused with *Pachycereus columna-trajani*, is not of this genus, for its ovary is glabrous and the fruit more or less fleshy and edible. Coulter, however, does state that it is closely related, if not identical, with one of the species of this genus, that is, *Pachycereus pecten-aboriginum.* It should be compared with *Cephalocereus macrocephalus.*

A mountain-side along Tomellin Canyon, Mexico, covered with *Pachycereus columna-trajani*.

10. LEPTOCEREUS (Berger) Britton and Rose, Contr. U. S. Nat. Herb. **12**: 433. 1909.

Arborescent, bush-like, vine-like, or diffusely branching cacti; joints with 3 to 8 prominent, thin, high, crenate ribs, without aërial roots; spines slender, acicular; flowers diurnal, small; ovary spiny; flower-tube short, campanulate, spiny; stamens very numerous, borne at the base of the throat, scarcely exserted; stigma-lobes a little exceeding the stamens; fruit globose to oblong, more or less spiny, fleshy; seeds numerous, black.

Type species: *Cereus assurgens* Grisebach.

This genus is composed of eight species, six of them Cuban, one Santo Domingan, and one Porto Rican. Some are weak and clambering; others develop woody trunks. The branches are strongly ribbed and armed with clusters of long acicular spines. The earliest species were referred to *Cereus*. *Leptocereus assurgens* and *L. quadricostatus*, the only species known to Schumann, were placed by him in different sections of the genus *Cereus*, the former in his series *Tortuosi* and the latter in his series *Oligogoni*. A. Berger in his treatment of *Cereus* proposed the subgenus *Leptocereus*, which we afterward raised to generic rank. *Cereus gonzalezii* and *C. tonduzii*, also referred here by Berger, we have referred to other genera.

The generic name is from the Greek, signifying thin-cereus, referring to the thin ribs.

KEY TO SPECIES.

Ultimate joints slender, 1 to 2 cm. thick.
- Vine-like, elongated; ultimate joints 1 cm. thick, 4 to 7-ribbed ..... 1. *L. weingartianus*
- Ultimate joints 2 cm. thick, 6 to 8 ribbed.
  - Tree-like, 5 meters high, the trunk 3 cm. in diameter at the base; flowers 3.5 cm. long, sparingly short-spiny ..... 2. *L. leonii*
  - Prostrate, creeping; flowers 1.5 cm. long, densely long-spiny ..... 3. *L. prostratus*

Ultimate joints stout, 2 to 6 cm. thick.
- Fruit densely long-spiny.
  - Bush-like, 1 to 3 meters high; ultimate joints 2 to 3 cm. thick; fruit 3 to 6 cm. long.
    - Joints 4-ribbed; spines brown ..... 4. *L. assurgens*
    - Joints 5 to 7-ribbed; spines yellow ..... 5. *L. maxonii*
  - Tree-like, 5 to 6 meters high; ultimate joints 5 to 6 cm. thick; fruit 8 to 10 cm. long ..... 6. *L. arboreus*
- Fruit sparingly short-spiny; tree-like species.
  - Joints 5 to 7-ribbed, the ribs very broad; fruit 7 to 8 cm. long ..... 7. *L. sylvestris*
  - Joints 3 to 4-ribbed, the ribs low; fruit 3 to 5 cm. long ..... 8. *L. quadricostatus*

1. Leptocereus weingartianus (Hartmann).

Cereus weingartianus Hartmann in Dams, Monatsschr. Kakteenk. **14**: 155. 1904.

Roots in clusters, tuberous, thick; stems becoming terete and woody below, the branches creeping or climbing among shrubs and trees, sometimes to the height of 8 to 10 meters; stems 4 to 7-ribbed, at first slender and weak, 1.5 to 2 cm. in diameter; areoles 1 to 1.5 cm. apart, circular,

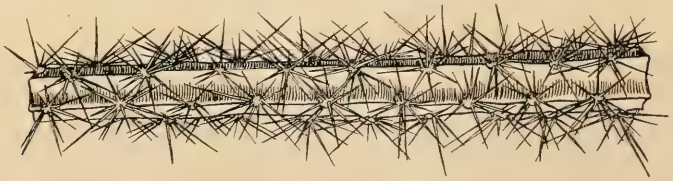


FIG. 112.—Part of branch of L. weingartianus. ×0.7.

small, at first filled with short, whitish wool (afterwards disappearing) and acicular spines at first brownish or yellowish brown but in age becoming gray; radial spines 10 to 12, spreading; central spines a little stouter than the radials, a little spreading, often as many as 6, bulbose at base, 1 to 1.5 cm. long; flowers small, about 4 cm. long; fruit about 2 cm. long, covered with clusters of small, deciduous spines.

Type locality: Haiti.

Distribution: Hispaniola.

This species has heretofore been known only from the type material from "Haiti." In 1913 Dr. Rose collected an abundance of both living and herbarium material near

Azua, Santo Domingo, and a little later received living specimens from Father M. Fuertes, of Barahona, Santo Domingo. Dr. Rose's material showed for the first time the peculiar root system of this species. With it also were old flowers and fruit, heretofore unknown. The species is rare about Azua, only two stations being found in the lower foothills north of the town (No. 3941). Dr. Paul Bartsch collected specimens in Haiti in 1917 (No. 221).

Illustration: Monatsschr. Kakteenk. **14**: 155, as *Cereus weingartianus*.

Figure 112 shows part of a branch of a plant collected by Dr. Rose at Azua, Santo Domingo, in 1913.

2. **Leptocereus leonii** Britton and Rose, Torreya **12**: 15. 1912.

Cereus leonii Vaupel, Monatsschr. Kakteenk. **22**: 66. 1912.

Plant up to 5 meters high, repeatedly branching, the rounded trunk 3 cm. in diameter at the base, the cortex scaly-roughened; ultimate branches about 1.5 cm. in diameter, slender, elongated, 6 to 8-ribbed; old areoles 1 to 1.5 cm. apart in vertical rows, bearing acicular spines; ribs crenate, with the areoles borne at the depressions; spines 6 to 12 at an areole, long, yellowish when young, gray when old, 2 to 9 cm. long; flower 3.5 cm. long, campanulate; inner perianth-segments pink, about 15, withering-persistent; tube of flower bearing scattered areoles each with 1 to 4 short spines or some of them spineless; fruit globose-ovoid, 2 cm. in diameter, with a few scattered spine-bearing areoles; seeds black.

Type locality: Sierra de Anafe, near Guayabal, Cuba.

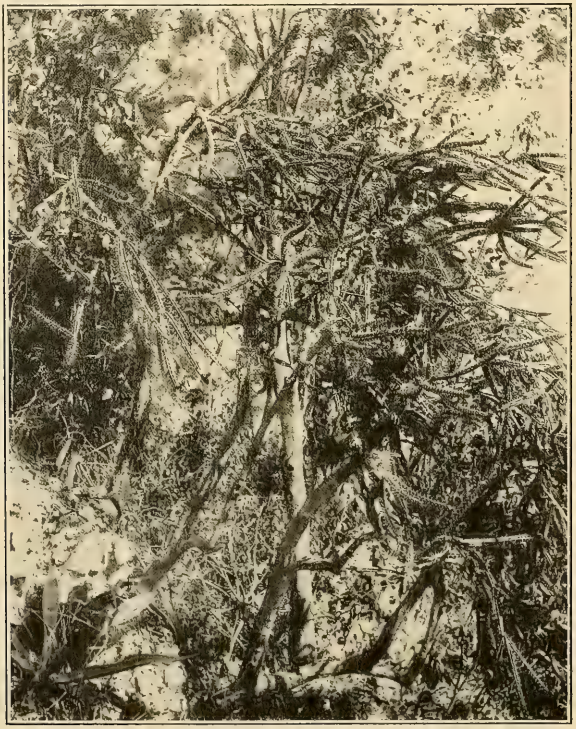


FIG. 113.—Leptocereus leonii.

Distribution: On limestone rocks, Sierra de Anafe and Sierra de Guane, western Cuba.

The wood is very hard; the flowers appear from August to November.

At the type locality this tree-like species inhabits a steep rocky slope and cliff, difficult of access, growing as a colony.

Figure 113 is from a photograph of the type plant, obtained by Brother Léon, of the Colegio de la Salle, Habana, in whose honor the species was named.

3. Leptocereus prostratus sp. nov.

Plant prostrate, bright green, 7-ribbed, 1.5 to 2 cm. thick, the ribs scarcely crenate; areoles elevated, about 1 cm. apart; spines 15 to 20 at an areole, acicular, 1 to 2 cm. long, yellow when young, gray when old; ovary densely covered with yellow spines; perianth about 1.5 cm. long; fruit about 1.5 cm. in diameter.

On high, dry, exposed rocks, La Guira, north of Sumidero, Pinar del Rio, Cuba (Shafer, No. 13754, August 17, 1912).

Leptocereus prostratus is related to *L. leonii*, which differs in having an erect trunk, the ribs of the branches deeply crenate, the areoles depressed in the crenatures, and larger flowers and fruit.

4. Leptocereus assurgens (C. Wright) Britton and Rose, Contr. U. S. Nat. Herb. **12**: 433. 1909.

Cereus assurgens C. Wright in Grisebach, Cat. Pl. Cub. 116. 1866.

Plant 2 to 3 meters high, not much branched, the ultimate joints 3 cm. in diameter or less; ribs 4; areoles 1 to 2.5 cm. apart; spines acicular, brown, 2 to 8 cm. long; flowers 4 to 5 cm. long; tube and ovary bearing scattered clusters of spines; inner perianth-segments short, numerous, spreading or even turned backward; stamens and style pale greenish white; fruit covered with clusters of short spines.

FIG. 114.—Leptocereus assurgens.

Type locality: Western Cuba.

Distribution: On limestone, near northern coast of Habana Province, Cuba.

This species was long known only from the collections of Charles Wright, but has been rediscovered by collectors connected with the New York Botanical Garden.

The name *Cereus pellucidus* (Pfeiffer, Enum. Cact. 108. 1837) belongs to this species or to some other Cuban member of the genus; the published description is not sufficiently complete to enable us to identify the plant more accurately.

Illustration: Schumann, Gesamtb. Kakteen f. 33, as *Cereus assurgens*.

Plate VIII, figure 4, shows a plant collected by Britton and Cowell at Cojimar, Cuba, in 1911, which flowered in the New York Botanical Garden in July 1915. Figure 114 is from a photograph obtained by Brother Léon at the same locality.

5. Leptocereus maxonii sp. nov.

Stems 1 to 1.5 meters high, more or less branched, erect or sometimes with recurved branches; ribs 5 or 7, usually 6, thin, 6 to 15 mm. deep, scalloped; areoles 1.5 to 2 cm. apart, circular; spines when young of a decided yellowish-brown color, dark brown or sometimes whitish in age, about 20 from an areole, needle-shaped, the longer ones 3 cm. long; flowers 5 to 6 cm. long; inner perianth-segments about 32, spreading at right angles to the tube, linear-oblong, yellowish green inside, the outer obtuse, the inner acute; stamens cream-colored; ovary and flower-tube densely covered with yellowish spines; immature fruit bur-like, 4 cm. long, densely covered with yellow or brownish spines.

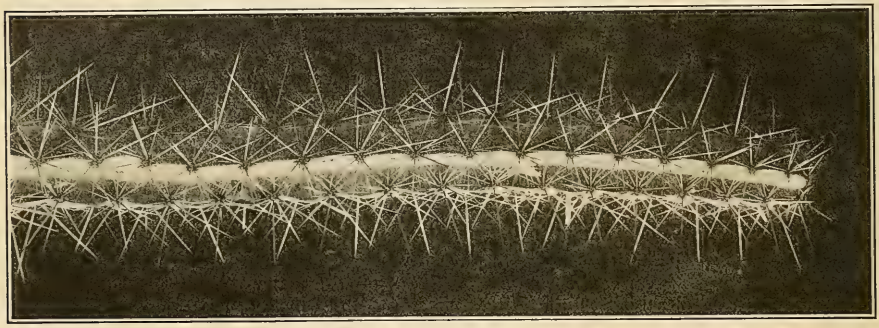


FIG. 115.—Leptocereus maxonii.

Collected by Wm. R. Maxon at Berraco, 8 miles east of Daiquiri, Cuba, April 13, 1907 (No. 4023), and by Britton and Cowell at the same locality, March 1912 (No. 12657, type).

This species differs from *L. assurgens* in habit, in having more ribs, and in the flowers and young shoots being covered with yellow spines and bristles instead of dark brown ones.

Figure 115 is from a photograph of a branch of the plant collected by Mr. Maxon as above cited.

6. Leptocereus arboreus Britton and Rose, Torreya **12**: 15. 1912.

Cereus arboreus Vaupel, Monatsschr. Kakteenk. **22**: 65. 1912.

Plants up to 6 meters high, erect, much branched; joints 3 to 10 dm. long, 5 to 6 cm. in diameter, narrowed at base; ribs 4, narrow, thin, 1.5 to 2 cm. deep, somewhat depressed between the areoles; areoles 2.5 to 4 cm. apart or less; spines 10 or fewer, acicular, yellowish, becoming gray, radiating, the longer up to 5 cm. long; flower short, campanulate, 2 to 3 cm. long; inner perianth-segments short, spreading, greenish white to cream-colored; ovary and flower-tube very spiny; fruit ellipsoid, 8 to 10 cm. long, 5 to 6 cm. in diameter, its areoles bearing tufts of numerous light-yellow spines.

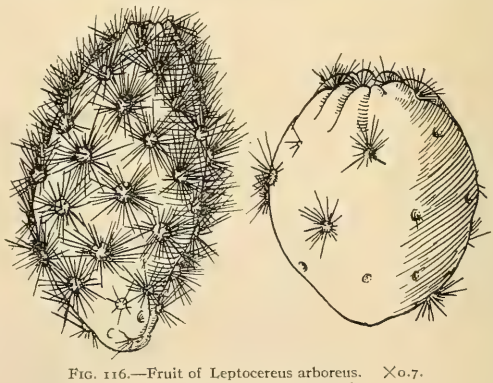


FIG. 116.—Fruit of Leptocereus arboreus. ×0.7.
FIG. 117.—Fruit of Leptocereus sylvestris. ×0.7.

Type locality: Punta Sabanilla, Santa Clara, Cuba.

Distribution: Near southern coast of the Province of Santa Clara, Cuba.

Plate XIII, figure 1, shows the plant collected by Britton, Cowell, and Earle at Castillo de Jagua, Cuba, in 1911, which flowered in the New York Botanical Garden in 1913. Figure 116 shows a fruit of the type specimen.

M. E. Eaton del.

1. Top of flowering branch of *Leptocereus arboreus*.
2. Top of stem of *Lemaireocereus griseus*.
3. Fruiting branch of *Mediocactus coccineus*.

(All natural size.)

7. Leptocereus sylvestris sp. nov.

Tree-like, up to 5 meters high; joints 2 to 3 cm. in diameter, 5 to 7-ribbed; ribs strongly crenate; areoles 1 to 1.5 cm. apart; spines light brown, long and acicular, the longest ones 9 cm. long; fruit subglobose, 7 to 8 cm. long, bearing clusters of short spines, these early deciduous.

Collected by Britton, Cowell, and Shafer in coastal woods, Ensenada de Mora, Province of Oriente, Cuba, March 20 to 29, 1912, No. 13060.

Figure 117 shows a fruit of the type specimen and figure 118 a branch.

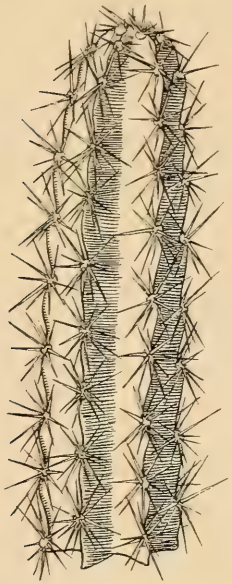


FIG. 118.—Top of branch of Leptocereus sylvestris. ×0.6.

FIG. 119.—Leptocereus quadricostatus.

8. Leptocereus quadricostatus (Bello) Britton and Rose, Contr. U. S. Nat. Herb. **16**: 242. 1913.

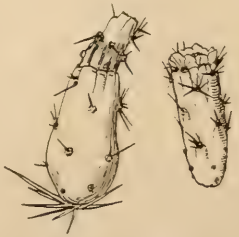
Cereus quadricostatus Bello, Anal. Soc. Esp. Hist. Nat. **10**: 276. 1881.

Plants erect or arching, up to 4 meters high, with numerous lateral, usually elongated branches, often forming thickets; branches dull, dark green, usually 4-ribbed, sometimes 3-ribbed, the ribs thin and low; spines acicular, 1 to 4 cm. long; flowers 4 cm. long, 2 cm. wide at the mouth; outer perianth-segments green; inner perianth-segments greenish white or yellowish white, truncate, the apex lacerate or erose; ovary and flower-tube bearing a few clusters of short spines; style and filaments greenish; fruit subglobose to obovoid, 3 to 5 cm. long, not very spiny, red.

Type locality: Porto Rico.

Distribution: Southwestern Porto Rico.

This plant inhabits hillsides and plains in the dry southwestern part of Porto Rico, sometimes forming dense thickets, penetrable only by the use of the machete; it is known as sebucan.



FIGS. 120 and 121.—Fruit and flower of L. quadricostatus. ×0.7.

Figure 119 is from a photograph taken by Frank E. Lutz at Ensenada, near Guanica, Porto Rico, in 1915; figure 120 shows a fruit collected by Dr. Britton and Dr. Shafer at Guanica in 1913; figure 121 shows a flower from a plant at the same locality.

PUBLISHED SPECIES, PERHAPS OF LEPTOCEREUS.

CEREUS PANICULATUS De Candolle, Prodr. 3: 466. 1828.

Cactus paniculatus Lamarck, Encyl. 1: 540. 1783.

This has long been in doubt and is known only from imperfect description and illustration. Lamarck states that it is from Santo Domingo, in a region called cul-de-sac, and is based on Burmann's plate 192 of Plumier. It is apparently a *Leptocereus*, perhaps *L. weingartianus*.

11. EULYCHNIA Philippi, Fl. Atac. 23. 1860.

Stout, erect or procumbent and ascending, green cacti, usually with many branches, the branches parallel-ribbed, armed with spines; perianth white to pinkish, withering and persisting on the ovary; flowers single at the areoles, opening during both day and night, short and broad for the group, with an open throat, the tube very short if not wanting altogether; scales on ovary and flower-tube numerous, their axils usually with bristles or long hairs; filaments very short, covering the face of the throat; style short and thick; fruit globular, fleshy, somewhat acid, hardly edible; seeds small, dull black, containing endosperm (according to Mr. Söhrens).

Type species: *Eulychnia breviflora* Philippi.

This genus as here defined contains 4 species found along the coast and central valleys of the provinces of Aconcagua, Coquimbo, Atacama, Antofagasta, and Tarapaca, Chile.

To this group, treated as a subgenus of *Cereus* by Mr. Berger, has been referred a number of anomalous species which we place elsewhere; they are similar to this genus in the fact that they have very short flower-tubes, but in habit, fruit, and other characters they are quitedistinct. These species will be discussed in this work under other genera.

The genus *Eulychnia* was first established in 1860 by Rudolph Philippi, who based it upon a single species, *E. breviflora*. In 1864 two other species, *E. acida* and *E. castanea*, were described, while the fourth is transferred by us from *Cereus*.

The plants are usually found on dry hills, and are often associated with other cacti and other desert plants. In many regions they form the dominant feature in the vegetation. At least two species are commonly used for fuel, and one (*E. acida*) is used for hedge fences.

The generic name is from the Greek, signifying a candlestick.

KEY TO SPECIES.

Areoles of the ovary and perianth-tube without stiff bristles.
  Areoles of the ovary and perianth-tube with long wool.
    Wool chestnut-brown; areoles of the joints small, little felted ..... 1. *E. spinibarbis*
    Wool white; areoles of the joints large, approximate, densely felted ..... 2. *E. iquiquensis*
  Areoles of the ovary and perianth-tube with very short wool ..... 3. *E. acida*
Areoles of the ovary and perianth-tube with stiff brownish bristles and short wool ..... 4. *E. castanea*

1. Eulychnia spinibarbis (Otto).

Cereus spinibarbis Otto in Pfeiffer, Enum. Cact. 86. 1837.
Cereus panoplaeatus Monville, Hort. Univ. 1: 220. 1840.
Eulychnia breviflora Philippi, Fl. Atac. 24. 1860.
Echinocereus spinibarbis Schumann, Monatsschr. Kakteenk. 5: 124. 1895.
Cereus breviflorus Schumann, Gesamtb. Kakteen Nachtr. 23. 1903.

Stems 2 to 4 meters high, much branched; branches 7.5 cm. in diameter; ribs 12 or 13; spines about 20 from an areole, usually 18 mm. long, but the longest one at times 15 cm. long; flowers 3 to 5 cm. long; scales on ovary and flower small, bearing in their axils long brown wool; outer perianth-segments short, acuminate; inner perianth-segments white to pinkish, oblong, 2 cm. long, acute; style short, 1.5 cm. long including the stigma-lobes; scales on the ovary small, their axils filled with long brown wool.

Type locality: Near Coquimbo, Chile.

Distribution: Along the coast of the province of Coquimbo, Chile.

The only difference Dr. Rose was able to observe in the field between this species and *E. acida* is the very woolly flower and fruit of *E. spinibarbis*. The flowers seemed to be identical in form, size, and color and at La Serena the two were growing side by side; the form with long silky wool on the flowers was never seen in the interior valleys, although thousands of flowers were there observed.

Cereus tortus (Förster, Handb. Cact. 391. 1846) may belong here.

Cereus chilensis breviflorus (Hirscht, Monatsschr. Kakteenk. 8: 159. 1898) doubtless belongs here, but has not been described.

Illustrations: Fl. Atac. pl. 2, f. A, as *Eulychnia breviflora;* Rep. Mo. Bot. Gard. 16: pl. 4, f. 1, as *Cereus breviflorus;* Schumann, Gesamtb. Kakteen f. 11, as *C. coquimbanus.*

Figure 122 is from a photograph of a plant brought by Dr. Rose to the New York Botanical Garden from the Botanical Garden of Santiago, Chile, under the name *Eulychnia breviflora*, in 1914.

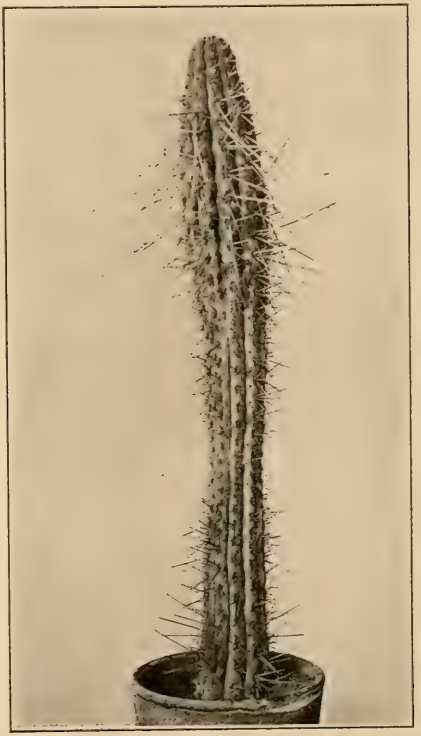


FIG. 122.—Eulychnia spinibarbis.

2. Eulychnia iquiquensis (Schumann).

Cereus iquiquensis Schumann, Monatsschr. Kakteenk. 14: 99. 1904.

Plant 2 to 7 meters high, when old quite spineless below, but very spiny toward the top; trunk usually very short, 2 to 2.5 cm. in diameter, its outer layers pulpy and yellow, terete, with many branches from near the base, these nearly erect or more or less spreading and again branching; ribs 12 to 15, no broader at base than above, somewhat tuberculate, separated by acute intervals; areoles approximate, sometimes with only a very little space between them, 5 to 10 mm. in diameter, with short white wool, on many old stems and branches the areoles die and fall, leaving a row of indentations along the top of the rib; spines various, on vigorous sterile shoots about 12 to 15 at an areole, most of them about 1 cm. long, while 1 or 2 are very stout, porrect, elongated, and sometimes 12 cm. long; on flowering branches the spines numerous, soft and hair-like or some of them bristle-like; flowers borne near the tops of branches, 6 to 7 cm. long including the ovary; flower-buds globular, covered with long, white, silky hairs; inner perianth-segments white, short; fruit globular, 5 to 6 cm. in diameter, fleshy, said to be acid, densely clothed with white hairs; seeds not known.

Type locality: Iquique, Province of Tarapaca, Chile.

Distribution: On top and slopes of the coastal hills in the Provinces of Atacama, Antofagasta, and Tarapaca, Chile.

According to published records, this species is known only from the original collection made by Carlos Reiche in 1904, and has never been in cultivation. Dr. Rose collected living, herbarium, and formalin specimens in 1914 not only at Iquique, but also at Antofagasta. It grows only on the coastal hills, which at both towns come down almost to the sea or rise from a narrow coastal plain, and is not found on the pampas, which extend east of the coastal hills to the Andes. In both the Provinces of Antofagasta and Tarapaca, it is the most conspicuous plant seen, in fact it is the only woody plant met with on their western borders. It is called by the natives copado, and the old dead branches are carried

to the towns and used for firewood. The flowers begin to appear late in October; the fruit is eaten by animals, doubtless by birds, as all old fruits had large holes on one side, and no seeds remained.

Plate xv, figure 1, shows the top of plant collected by Dr. Rose at Antofagasta, 1914.

3. **Eulychnia acida** Philippi, Linnaea **33**: 80. 1864.

Cereus acidus Schumann, Gesamtb. Kakteen Nachtr. 22. 1903.

Plant various in habit, usually 3 to 7 meters high, with a definite trunk 1 meter long and then more or less branching, forming a more or less rounded top, but sometimes without trunk, forming a low mass 1 meter high or less, with branches often procumbent or ascending; ribs 11 to 13, broad and low; spines various, nearly porrect, grayish in age but brownish when young, sometimes 20 cm. long; flowers 5 cm. long, turbinate, 13 cm. in circumference at top; ovary and tube covered with small, ovate, imbricating scales, fleshy at base but with acute, callous tips; limb somewhat oblique; inner perianth-segments at first pale rose-colored, then white, 20 to 22 mm. long; throat very short, covered with stamens; stamens white, 1 to 1.5 cm. long, included; style 2 cm. long, stiff, white, with 12 to 15 stigma-lobes; fruit fleshy, somewhat acid.

Type locality: Near Illapel and Choapa, Chile.

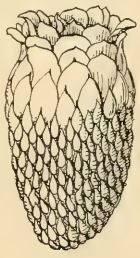
Distribution: From near Choapa to Copiapo, in western Chile.

This species is called tuna de cobado by the natives, according to Philippi.

This species was originally described from material obtained by Landbeck near Illapel and Choapa, but nothing of the type has been preserved in the Philippi herbarium at Santiago. Dr. Rose, however, visited both Illapel and Choapa in 1914, and was able to decide definitely upon the species described by Philippi. At both places *E. acida* was quite common, usually growing with *Cereus chiloensis*, but from which it differs so much in habit and flowers that one is soon able to distinguish the two readily.

It is sometimes referred to as *Cereus chilensis acidus* (Monatsschr. Kakteenk. **8**: 159. 1898), but the name has never been formally published.

Figure 123 shows a flower collected by Dr. Rose at Illapel, Chile, in 1914.



123

124

FIG. 123.—Flower of Eulychnia acida. ×0.7.
FIG. 124.—Flower of Eulychnia castanea. ×0.7.

4. **Eulychnia castanea** Philippi, Linnaea **33**: 80. 1864.

Cereus castaneus Schumann, Gesamtb. Kakteen Nachtr. 22. 1903.

Forming dense thickets sometimes 20 meters broad; branches 6 to 8 cm. in diameter, spreading at base or decumbent, with ascending tips, reaching a height of 1 meter or less; ribs 9, 10, or 11, low and rounded; areoles about 1 cm. apart, large and circular; spines, when young, yellow with brown tips, gray or nearly white in age; radial spines 8 to 10, unequal but short, usually 5 to 20 cm. long; central spine 1, 6 to 10 cm. long, stout, porrect; flowers borne near the tips of the branches, 3 to 5 cm. long; ovary tuberculate, its numerous areoles with short brown wool and slender brown bristles 1 to 1.5 cm. long, resembling somewhat a chestnut bur; areoles subtended by minute scales each with a callous tip; inner perianth-segments 1 to 1.5 cm. long, broad, with mucronate tips, white or pinkish; fruit globular, said to be insipid, 5 cm. in diameter, fleshy, the small scales persistent, but nearly devoid of bristles except near the top, crowned by the withering perianth; seeds 1.5 mm. long, dull black.

Type locality: Near Los Molles, Province of Aconcagua, Chile.

Distribution: On bluffs near and facing the sea along the shores of Aconcagua from Los Molles to Los Vilos.

The history of this species, though short, is interesting. It was collected by Landbeck, at Los Molles, Chile, in November 1862, and was described by Rudolph Philippi in 1864. The type material, consisting of two flowers and a few bunches of spines, is preserved in the Museo Nacional de Santiago. Unfortunately, the original material and labels

had been mixed with other species, but Dr. Rose, who studied the Philippi collection in 1914, was able to make the separation, and through the kindness of the Director, brought back a flower and cluster of spines, which are now preserved in the United States National Herbarium in Washington. From 1862 to 1914 there is no record that this species has been seen by botanists. Dr. Rose, while exploring in Chile, after several efforts was finally successful in obtaining living, herbarium, and formalin material (No. 19393), and also a fairly good photograph.

Figure 124 shows a flower collected by Dr. Rose at the type locality in 1914.

12. **LEMAIREOCEREUS** Britton and Rose, Contr. U. S. Nat. Herb. **12**: 424. 1909.

Stenocereus Riccobono, Boll. R. Ort. Bot. Palmero **8**: 253. 1909.

Plants usually large, tall, and branching, but rarely low, nearly prostrate, simple, forming thickets; areoles rather large, felted; spines usually stout and numerous; flowers diurnal or in some species nocturnal, one at an areole, tubular-funnelform or campanulate, the short tube tardily separating with the style from top of the ovary; stamens numerous, borne in many rows all along the inner surface of the throat; ovary more or less tubercled, bearing scales felted in the axils, the areoles at first spineless or nearly so, soon developing a cluster of spines; fruit globular to oval, often edible, irregularly bursting when old, exposing the seeds, at first very spiny, but when ripe the spines are often deciduous; seeds many, black.

The genus commemorates Charles Lemaire (1801–1871), a distinguished French cactologist and horticulturist; it consists of about 21 species, distributed from southern Arizona and Cuba to Peru and Venezuela.

Type species: *Cereus hollianus* Weber.

Key to Species.

A. Ribs 6 to 20, separated by deep intervals.
  B. Areoles with white, brown, or gray felt, not glandular.
    Spines slender, acicular to subulate.
      Spines not appressed to the joints, a central one usually evident.
        Ribs 6 to 12.
          Areoles borne on ribs, when these are crenate borne on elevations.
            Joints green, not glaucous.
              Flowers 10 cm. long; central spine long, reflexed ..... 1. *L. hollianus*
              Flowers 7 to 9 cm. long; central spine spreading or ascending ..... 2. *L. hystrix*
            Young growth glaucous, the bloom persistent as curved, whitish streaks.
              Spines subulate; plants relatively light green.
                Ribs 8 to 10; young growth slightly glaucous ..... 3. *L. griseus*
                Ribs 6 or 7; young growth definitely glaucous.
                  Spines terete, 5 cm. long or less ..... 4. *L. pruinosus*
                  Spines flattened above, up to 8 cm. long ..... 5. *L. longispinus*
              Spines acicular; plants dark green ..... 6. *L. eichlamii*
          Areoles borne in depressions of the crenate ribs.
            Plants bright green.
              Flowers greenish yellow to rose.
                Ribs 9 to 12; flowers greenish yellow ..... 7. *L. chichipe*
                Ribs 7 to 9; flowers rose-colored ..... 8. *L. chende*
              Flowers white ..... 9. *L. godingianus*
            Plants glaucous, the bloom persistent as whitish streaks.
              Ribs 6 to 8, bluntly acute ..... 10. *L. aragonii*
              Ribs 8 to 12, rounded ..... 11. *L. stellatus*
        Ribs about 20 ..... 12. *L. treleasei*
      Spines usually all radial, appressed to the joints ..... 13. *L. deficiens*
    Spines very stout, at first reddish brown or nearly black ..... 14. *L. weberi*
  BB. Areoles with dark brown or black felt, glandular.
    Ribs 6 to 8.
      Scales of the ovary 2 mm. long or less ..... 15. *L. queretaroensis*
      Scales of the ovary 4 to 6 mm. long ..... 16. *L. montanus*
    Ribs 12 to 17 ..... 17. *L. thurberi*
A. Ribs 3 to 7, separated by broad and shallow intervals.
  Areoles large, widely separated.
    Stems very stout, erect.
      Stems bluish gray; spines of fruit brown ..... 18. *L. laetus*
      Stems green; spines of fruit yellow ..... 19. *L. cartwrightianus*
    Stems slender, weak, usually 3 or 4-ribbed ..... 20. *L. humilis*
  Areoles small, nearly contiguous ..... 21. *L. dumortieri*

1. Lemaireocereus hollianus (Weber) Britton and Rose, Contr. U. S. Nat. Herb. **12**: 425. 1909.

Cereus hollianus Weber in Coulter, Contr. U. S. Nat. Herb. **3**: 411. 1896.
Cereus bavosus Weber in Schumann, Gesamtb. Kakteen 84. 1897.

Stem simple or branching only at base, 4 to 5 meters high; ribs 8 to 12, acute; areoles 1 to 3 cm. apart; spines at first bright red, but soon gray; radial spines about 12, very unequal, 1 to 3 cm. long, mostly spreading; centrals 3 to 5, swollen at base, unequal, the lower ones much longer than the others, sometimes 10 cm. long, strongly deflexed; flowers borne at the upper areoles, 10 cm. long, white; scales on ovary and flower-tube with lanate and bristly axils; fruit "as large as a goose egg," dark purple to red, covered with clusters of spines and bristles; seeds black, shining.

Type locality: Tehuacán, Puebla, Mexico.

Distribution: Puebla, Mexico.

This is a remarkable species, with unusually large fruit. It is called by the Mexicans bavoso.

The two names *C. hollianus* and *C. bavosus* are based on Weber's collection of 1864–66, and hence the latter is a synonym.

About the town of Sebastian in southern Puebla it is used as a hedge plant as well shown in our illustration.

Cereus brachiatus Galeotti (Salm-Dyck, Cact. Hort. Dyck. 1849. 195. 1850) must be very close to *L. hollianus*, if not identical, although Schumann did not believe they were the same; both came from near Tehuacán, Mexico. *Cereus militaris californicus* (Schumann, Gesamtb. Kakteen 85. 1897) is said to be a horticultural form of *Cereus bavosus*.

Illustrations: Contr. U. S. Nat. Herb. **10**: pl. 19, as *Cereus hollianus;* Möllers Deutsche Gärt. Zeit. **29**: 438. f. 14, as *Cereus bavosus*.

FIG. 125.—Lemaireocereus hollianus.

Figure 125 is from a photograph by Dr. Rose at Sebastian, Puebla, Mexico, in 1905.

2. Lemaireocereus hystrix (Haworth) Britton and Rose, Contr. U. S. Nat. Herb. **12**: 425. 1909.

Cactus hystrix Haworth, Suppl. Pl. Succ. 73. 1819.
Cereus hystrix Salm-Dyck, Observ. Bot. **3**: 7. 1822.
Echinocactus hystrix Haworth, Phil. Mag. **7**: 116. 1830.

Plant often 8 to 12 meters high and then with 10 to 50 erect branches; trunk short, often indefinite, sometimes 3 dm. in diameter; branches 7 to 10 cm. in diameter, with 9 or 10, rarely 12, ribs separated by V-shaped intervals; spines gray with brown tips, acicular, the radials about 10; central spines usually 3, one often longer than the others, often 4 cm. long; flower, including the ovary, 8 to 9 cm. long; tube 5 cm. long, broadly obconic, 3 cm. broad at mouth, spineless, purplish to dark green, bearing few short broad scales; inner perianth-segments white, spreading or recurved; stamens numerous, erect, white; style white, slender, club-shaped; ovary tuberculate, spineless, bearing small ovate scales; fruit 5 to 6 cm. long, longer than broad, scarlet, covered with clusters of deciduous spines, when mature breaking open and exposing the dark red pulp.

Type locality: West Indies.

Distribution: Dry parts of Cuba, Jamaica, Hispaniola, and the Porto Rican islands Desecheo and Cayo Muertos.

On the outskirts of Kingston, Jamaica, the stout branches are planted close together, forming a fence or an almost impenetrable hedge about fields, especially along the roadsides

The flowers of this species open at about 7 o'clock in the evening in Jamaica. The style is exserted from the tip of the bud several days before the flower opens, but it seems to be withdrawn before the flower is ready to expand. The flower-tube cuts off from

FIG. 126.—Lemaireocereus hystrix.

the ovary as is done in *Cereus*, except that the style comes off with the perianth. Numerous wasps visit the flowers to gather the nectar which oozes from the back of the scales on the flower-tube.

The plant is called Spanish dildos in Jamaica. On hillsides at the United States Naval Station, Guantánamo Bay, Cuba, this cactus occurs in great abundance, forming large colonies, individual plants differing much in the length of their spines, which in some are all less than 1 cm. long.

Illustrations: Journ. N. Y. Bot. Gard. **10:** f. 20, as *Cereus hystrix;* Gard. Chron. II. **10:** 185. f. 37; Möllers Deutsche Gärt. Zeit. **18:** 342, as *Cereus swartzii.*

Figure 126 is from a photograph taken by Marshall A. Howe near Guantánamo Bay, Cuba, in 1909; figure 127 shows a flower collected by William Harris in Jamaica and figure 128 a fruit from the same source.

Here is probably to be referred Descourtilz's plate 419 (Fl. Med. Antill., vol. 6), which he supposed to be *Cactus fimbriatus* Lamarck. This plate seems to be based largely on Burmann's plate of Plumier 195, f. 2. This latter plate was made the type of Haworth's *Cereus grandispinus* (Phil. Mag. **7:** 113. 1830; *Pilocereus grandispinus* Lemaire, Rev. Hort. **1862:** 427. 1862).

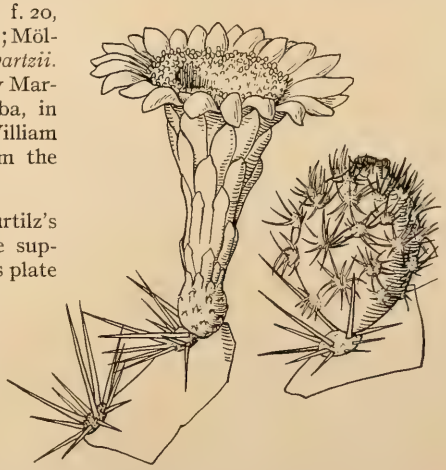


FIG. 127.—Flower of Lemaireocereus hystrix. ×0.7.
FIG. 128.—Fruit of same.

3. Lemaireocereus griseus (Haworth) Britton and Rose, Contr. U. S. Nat. Herb. **12:** 425. 1909.

Cereus griseus Haworth, Syn. Pl. Succ. 182. 1812.
Cereus eburneus Salm-Dyck, Observ. Bot. 3: 6. 1822.
Cereus crenulatus griseus Salm-Dyck in Pfeiffer, Enum. Cact. 85. 1837.
Cereus eburneus polygonus Pfeiffer, Enum. Cact. 91. 1837.
Cereus resupinatus Salm-Dyck, Allg. Gartenz. 8: 10. 1840.
*Cereus gladiger** Lemaire, Hort. Univ. **6:** 60. 1845.

*At place cited, by error spelled *gladiiger*, which some have cited as *gladilger*, thus making another error.

Plant 8 meters high or less, sometimes branching at the base, sometimes with a definite trunk up to 3.5 dm. in diameter, smooth when old; branches 8 to 10-ribbed, more or less glaucous; spines acicular, gray, the longer ones 4 cm. long; flower-bud obtuse or rounded at apex, covered with overlapping scales, these obtuse and brown; flowers pinkish, 7 cm. long; inner perianth-segments white; style exserted before the flower opens; fruit subglobose, about 5 cm. in diameter, spiny, edible, the pulp red.

Type locality: South America, but no definite locality cited.

Distribution: Northern coast of Venezuela and adjacent islands; Curaçao; Aruba; Bonaire; Margarita; Patos Island, Trinidad; and now cultivated in many parts of tropical America for its delicious fruits.

Cereus polygonatus (Pfeiffer, Enum. Cact. 91. 1837) was given as a synonym of *C. eburneus polygonus*.

Cactus coquimbanus, a Chilean species, has sometimes been confused with this species.

Cereus gladiger, sometimes referred to Cels and sometimes to Lemaire as the author, seems to have come originally from Colombia.

In this species as well as in many others, abnormal forms occur, among which is *C. eburneus monstrosus* Salm-Dyck (De Candolle, Prodr. 3: 465. 1828).

Cereus enriquezii (Monatsschr. Kakteenk. 19: 92. 1909) was sent to Europe from Jalapa, Mexico, by Señor Murrilo. It is considered by W. Weingart to be *C. eburneus monstrosus*.

The common cultivated species of Mexico seems to belong here.

According to Boldingh, this cactus is known in the Dutch West Indies as daatoe, kadoesji, and jaatoe. It is widely grown on Curaçao Island as a hedge plant, where the branches are planted close together in rows.

According to Captain Lens, poor people of Curaçao use the fleshy branches as a vegetable. Mr. Harold G. Foss states that in the region of Coro, Venezuela, the natives use the wood in making the roofs and walls of their houses. The heart wood is split into two pieces and then tied to the rafters so as to form the support for the mortar and tiles. The wood is rich in potash, and the ash from it is shipped in large quantities to the United States for use as a fertilizer.

Fig. 129.—Lemaireocereus griseus.

Illustration: Contr. U. S. Nat. Herb. 12: pl. 67.

Plate XIII, figure 2, shows the top of a plant collected on Curaçao. Figure 129 is from a photograph taken by Mrs. J. N. Rose on the same island in 1916.

4. **Lemaireocereus pruinosus** (Otto).

Echinocactus pruinosus Otto in Pfeiffer, Enum. Cact. 54. 1837.
Cactus pruinosus Monville in Steudel, Nom. ed. 2. 1: 246.1840.
Cereus pruinosus Otto in Förster, Handb. Cact. 398. 1846.
Cereus laevigatus Salm-Dyck, Cact. Hort. Dyck. 1849. 204. 1850.

Plant usually tall, with a more or less definite trunk; ribs 5 or 6, very high, separated by broad intervals; spines few, the radial ones 5 to 7, brownish; central spine solitary, 3 cm. long; flowering areoles large, brown-felted; flowers about 9 cm. long; upper scales and outer perianth-segments 1 cm. long or less, rounded at apex; inner perianth-segments longer and thinner than the outer ones. ovary with numerous brown-felted areoles; fruit ovoid, spiny, 6 to 7 cm. long.

Type locality: Mexico.

Distribution: South-central Mexico.

This plant is certainly native in south-central Mexico, and distinguishable from the related cultivated *L. griseus* by fewer ribs, larger flowers, and ovoid fruit.

Cereus roridus (Pfeiffer, Enum. Cact. 54. 1837) was given as a synonym of *Echinocactus pruinosus*.

Cereus edulis Weber (Monatsschr. Kakteenk. 10: 55. 1900) is another name for this species, never described.

Illustrations: Bull. Soc. Acclim. France 52: f. 1, as *Cereus pruinosus;* Bradley, Hist. Succ. Pl. ed. 2. pl. 12, as *Cereus americanus octangularis;* Monatsschr. Kakteenk. 18: 171, in part; 21: 37; U. S. Dept. Agr. Bur. Pl. Ind. Bull. 262: pl. 8; pl. 13, f. 2; MacDougal, Bot. N. Amer. Des. pl. 23; Journ. N. Y. Bot. Gard. 8: f. 6, all these as *Cereus eburneus*.

Figure 130 shows a fruit collected by H. H. Rusby in Oaxaca in 1910.

FIG. 130.—Fruit of Lemaireocereus pruinosus. ×0.7.

5. Lemaireocereus (?) longispinus sp. nov.

Erect, rather stout, light green, the young growth more or less glaucous; ribs 6, broad at base, somewhat acute, more or less undulate; areoles borne at the tops of the undulations; radial spines about 10, spreading or even reflexed, acicular; central spine elongated, porrect, flattened above, up to 8 cm. long, gray; flowers and fruit unknown.

Collected by F. Eichlam in Guatemala in 1909.

Figure 131 is from a photograph of the type specimen in the collection of the New York Botanical Garden.

6. Lemaireocereus eichlamii nom. nov.

Cereus laevigatus guatemalensis Eichlam in Weingart, Monatsschr. Kakteenk. 22: 182. 1912. Not *C. guatemalensis* Vaupel.

Cylindric, simple in cultivation, deep green except for narrow glaucous bands showing the commencement of new growth; ribs 8 to 10, rather broad and rounded, with acute intervals between; areoles large, brown-felted at first, soon gray; spines 4 to 6, acicular, nearly porrect, 2 cm. long or less; flower-buds obtuse; flower 6 to 7 cm. long; outer perianth-segments greenish purple, obtuse, with serrulate margins; inner perianth-segments purple, 10 to 15 mm. long, widely spreading or even rolled backward; tube proper 15 to 18 mm. long, ribbed within; tube funnelform, 2.5 cm. long, its surface covered with stamens; filaments unequal, white, numerous; style slender, white below, orange above, included; ovary tuberculate, each tubercle crowned by a minute scale; areoles on the ovary bearing brown felt but no spines.

Type locality: Guatemala.
Distribution: Guatemala.
Illustration: Monatsschr. Kakteenk. 22: 183, as *Cereus laevigatus guatemalensis*.
Figure 132 shows a plant in the collection of the New York Botanical Garden.

7. Lemaireocereus chichipe (Gosselin).

Cereus chichipe Gosselin, Bull. Mus. Hist. Nat. Paris 11: 507. 1905.
Cereus mixtecensis J. A. Purpus, Monatsschr. Kakteenk. 19: 52. 1909.
Lemaireocereus mixtecensis Britton and Rose, Contr. U. S. Nat. Herb. 12: 425. 1909.

Tree-like, up to 5 meters high, with a short trunk 8 to 10 dm. in diameter and a large very much branched top; branches 9 to 12-ribbed, undulate, acutish, 2 cm. high; areoles 1 to 1.5 cm.

apart; radial spines 6 or 7, 5 to 10 cm. long, grayish; central spine 1; flowers small, yellowish green; fruit spiny, globose, 2 to 2.5 cm. in diameter, red both within and without; seeds small, black, with a basal hilum.

Type locality: Cerro Colorado, near Tehuacán, Mexico.

Distribution: Puebla and Oaxaca, Mexico.

The plant is known as chichipe, or, according to Dr. C. A. Purpus, chichibe. The fruit, which is sold in the Mexican markets, like many other Mexican cactus fruits, has a different name from the plant; it is called chichituna.

Illustrations: Bull. Soc. Acclim. France **52**: f. 7, as *Cereus chichipe;* Monatsschr. Kakteenk. **19**: 53, as *Cereus mixtecensis.*

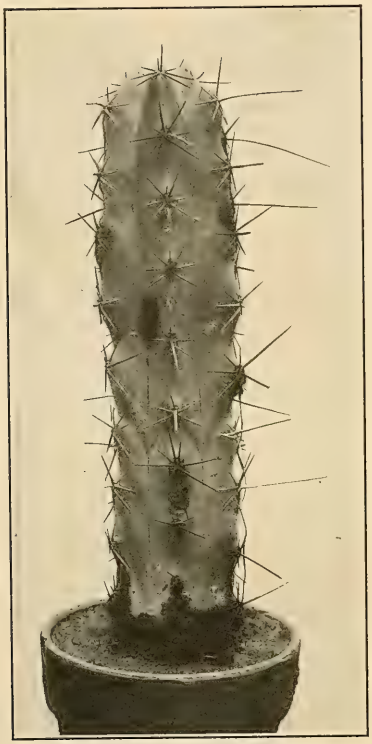


FIG. 131.—Lemaireocereus longispinus.

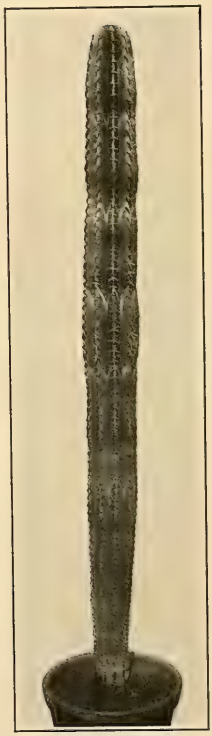


FIG. 132.—L. eichlamii.

8. Lemaireocereus chende (Gosselin).

Cereus chende Gosselin, Bull. Mus. Hist. Nat. Paris **11**: 506. 1905.
Cereus del moralii J. A. Purpus, Monatsschr. Kakteenk. **19**: 89. 1909.

Plant 5 to 7 meters high, with a short indefinite trunk, very much branched above, forming a large top; branches rather slender, ascending or erect; ribs 7 to 9, rather sharp; areoles on old branches 1.5 cm. apart, on young branches perhaps closer together; radial spines usually 5, the centrals when present a little longer than the radials, brown to bright yellow, in age grayish, acicular; flowers small, about 3 to 4 cm. long including the ovary; fruit said to be deep red, very spiny.

Type locality: In the Cerro Colorado, near Tehuacán, Mexico.

Distribution: Puebla and Oaxaca, Mexico.

According to Roland-Gosselin, the Mexican name for this species is chende; according to J. A. Purpus, chente; and according to Dr. Rose, chinoa. Dr. Rose collected this species between Tehuacán and Esperanza in 1912 (No. 11429) and Dr. C. A. Purpus sent a living plant to Washington in 1909 from San Luis, Oaxaca, Mexico. Dr. Purpus's plant has 7 acute ribs.

Illustrations: Bull. Soc. Acclim. France 52: f. 6, as *Cereus chende*; Monatsschr. Kakteenk. 19: 87, as *Cereus del moralii;* Contr. U. S. Nat. Herb. 12: pl. 68, as *Lemaireocereus mixtecensis*, in error.

Figure 133 is from a photograph taken by Dr. MacDougal near Tehuacán in 1906.

FIG. 133.—Lemaireocereus chende.

9. Lemaireocereus godingianus sp. nov.

Large plant 3 to 10 meters high with a short, thick, woody trunk 2 to 5 dm. in diameter, becoming smooth; joints bright green when young, grayish afterwards; ribs 7 to 11; spines acicular, 2 to 4 cm. long, brownish when young; flowers large, white, 10 to 11 cm. long; tube proper 2 cm. long with walls 1 cm. thick or more; areoles on flower-tube and ovary closely set, large, bearing brown wool and yellow bristles; fruit large, 10 cm. long or more, covered with yellow spines.

Collected by J. N. Rose and George Rose at Huigra, Ecuador, August to November 1918 (No. 22127).

This species is very common on the dry hills both below and above Huigra, Ecuador, ranging from about 3,500 to 6,000 feet, where it is the most conspicuous plant in the landscape. It is associated with a *Furcraea*, several species of *Opuntia*, a *Bauhinia*, and a *Zanthoxylum*. It is frequently overrun by vines, such as species of *Passiflora* and *Ipomoea*.

It overlaps the lower range of an undescribed species of *Trichocereus* and has been frequently confused with that species. (See page 135.)

This plant is named for Dr. F. W. Goding, United States Consul-General at Guayaquil, Ecuador, a well-known entomologist, who assisted Dr. Rose in his botanical explorations in Ecuador.

Illustration: Smiths. Misc. Coll. **70**: f. 48, as giant cactus.

Figure 134 is from a photograph taken by George Rose at Huigra.

FIG. 134.—Lemaireocereus godingianus.

10. Lemaireocereus aragonii (Weber).

Cereus aragonii Weber, Bull. Mus. Hist. Nat. Paris **8**: 456. 1902.

Columnar, 5 to 6 meters high, dark green with glaucous bands at intervals of growth; terminal branches about 3 meters long, 12 to 15 cm. in diameter; ribs 6 to 8, very large, 2 to 3 cm. high, rounded; areoles about 2 cm. apart, large, brown-felted; spines gray, about 8 to 10, but new ones developed from time to time, acicular, the radial ones about 1 cm. long, one of the centrals 2 to 3 cm. long; flowers 6 to 8 cm. long; ovary tuberculate, bearing clusters of spines; flesh of the fruit white; seeds large, black, 5 to 6 mm. long.

Type locality: Western Costa Rica.

Distribution: Costa Rica.

This cactus is used a good deal as a hedge plant in Costa Rica, much as is *Pachycereus marginatus* on the table-lands of Mexico. It is the only columnar cactus in Costa Rica. We have had living specimens of it in Washington since 1907, but they have never grown very much.

A cristate form of *Cereus aragonii* was named as a variety (*palmatus*) by Weber (Bull. Mus. Hist. Nat. Paris **8**: 456. 1902).

Illustrations: Boletin de Fomento Costa Rica **4**: 117; Iberica **48**: 339, both illustrations from the same source as the one used as figure 135.

Figure 135 is from a photograph taken by Otto Lutz at Tres Rios, Costa Rica, 1,350 meters altitude.

11. Lemaireocereus stellatus (Pfeiffer) Britton and Rose, Contr. U. S. Nat. Herb. **12**: 426. 1909.

Cereus stellatus Pfeiffer, Allg. Gartenz. **4**: 258. 1836.
Cereus dyckii Martius in Pfeiffer, Enum. Cact. 87. 1837.
Cereus tonelianus Lemaire, Illustr. Hort. **2**: Misc. 63. 1855.
Stenocereus stellatus Riccobono, Boll. R. Ort. Bot. Palermo **8**: 253. 1909.
*Stenocereus stellatus tonelianus** Riccobono, Boll. R. Ort. Bot. Palermo **8**: 254. 1909.

Plant 2 to 3 meters high, branching at base, rarely branching above, pale bluish green; ribs 8 to 12, low, obtuse; radial spines 10 to 12; centrals several, often much longer than the others, some-

*Riccobono in error spells it "*tenellianus*."

times 5 to 6 cm. long; areoles 1 to 2 cm. apart; flowers appearing at or near the top of the plant, red, small, narrowly campanulate, about 4 cm. long; ovary bearing small scales subtending wool and bristly spines; fruit red, spiny, globular, about 3 cm. in diameter; spines deciduous; seeds dull, pitted.

Type locality: Mexico.

Distribution: Southern Mexico.

The fruit is known in the markets as joconostle and sometimes as tuna.

The above description is drawn from Dr. Rose's specimens, which seem to represent *L. stellatus*, but the identification has not been confirmed by reference to the type specimen.

Cereus joconostle Weber (Schumann, Gesamtb. Kakteen 79. 1897) is known only as a synonym of this species.

FIG. 135.—Lemaireocereus aragonii.

Illustrations: Contr. U. S. Nat. Herb. **10**: pl. 20; Rep. Mo. Bot. Gard. **16**: pl. 3, f. 1 to 4; U. S. Dept. Agr. Bur. Pl. Ind. Bull. **262**: pl. 12, as *Cereus stellatus;* Bull. Soc. Acclim. France **52**: f. 3, as *Cereus dyckii;* Contr. U. S. Nat. Herb. **12**: pl. 69.

Figure 136 is from a photograph taken by Dr. MacDougal at Tomellín, Mexico, in 1906.

12. Lemaireocereus treleasei Britton and Rose, Contr. U. S. Nat. Herb. **12**: 426. 1909.

Cereus treleasei Vaupel, Monatsschr. Kakteenk. **23**: 37. 1913.

Plant 5 to 7 meters high, simple or with a few strict branches; ribs about 20; areoles approximate with a peculiar V-shaped depression just above each one; spines rather short, yellowish; flowers pinkish, 4 to 5 cm. long, diurnal; scales on ovary and flower-tube subtending slender whitish bristles; fruit red, about 5 cm. in diameter, covered with clusters of deciduous spines; seeds black with a dull, rugose surface and a large oblique basal hilum.

Type locality: Road between Mitla and Oaxaca, Mexico.

Distribution: Oaxaca, Mexico.

In flower and fruit this much resembles *L. stellatus*, but has a different habit, more ribs, and different areoles. This plant is not common in the deserts about Oaxaca, but when it does occur is found in clumps. It is characterized by its strict elongated stems, which seldom branch.

Illustration: Contr. U. S. Nat. Herb. **12**: pl. 70.

Figure 137 is from a photograph taken by Dr. MacDougal at the type locality in 1906.

FIG. 136.—Lemaireocereus stellatus.

13. **Lemaireocereus deficiens** (Otto and Dietrich).

Cereus deficiens Otto and Dietrich, Allg. Gartenz. **6**: 28. 1838.
Cereus clavatus Otto and Dietrich, Allg. Gartenz. **6**: 28. 1838.
Cereus eburneus clavatus Fobe, Monatsschr. Kakteenk. **18**: 78. 1908.

A tall tree-like plant, with a more or less definite trunk and many stout erect branches, the old trunk often spineless; branches somewhat glaucous; ribs 7 or 8, very broad at base; areoles borne at the depressions on the ribs, large, white or brown-felted; spines about 8, grayish with black tips, more or less spreading, sometimes appressed, 1 to 1.5 cm. long, the clusters either with or without central ones, these, when present, 3 cm. long and a little flattened; flowers only 5 to 6 cm. long; ovary without spines, the areoles felted; fruit very spiny, edible, its flesh either red or white, juicy.

Type locality: Carácas, Venezuela.

Distribution: Central part of coast of Venezuela.

This species is common on all the hills about La Guayra, is less common in the mountains toward Carácas, and is also to be found along the coast at Puerto Cabello. About towns it is much used as a hedge plant.

Figure 138 is from a photograph taken by Mrs. J. N. Rose near Puerto Cabello, Venezuela, in 1916.

FIG. 137.—Lemaireocereus treleasei.

14. **Lemaireocereus weberi** (Coulter) Britton and Rose, Contr. U. S. Nat. Herb. **12**: 426. 1909.

Cereus weberi Coulter, Contr. U. S. Nat. Herb. 3: 410. 1896.
Cereus candelabrum Weber in Schumann, Gesamtb. Kakteen 106. 1897.

Plant very large, 10 meters high or more, with a trunk short but thick and often with hundreds of nearly erect branches arising from near the base, dark bluish green, slightly glaucous; ribs usually 10, rounded; areoles large; radial spines usually 6 to 12, spreading, more or less acicular, 1 to 2 cm. long; central spine usually up to 10 cm. long, solitary, flattened, often more or less deflexed, except those of the upper areoles, at first brown to blackish, much longer than the laterals; areoles white-felted; flowers 8 to 10 cm. long; scales on flower-tube narrow, thin, bearing long brown hairs in their axils; inner perianth-segments oblong, 2 cm. long; ovary globular, covered by the dense brown felt of its areoles; fruit oblong, edible, 6 to 7 cm. long, very spiny, the spine-clusters deciduous in ripening.

Type locality: A few miles south of Tehuacán, Puebla, Mexico.
Distribution: Puebla and Oaxaca, Mexico.

This plant is called cardon and candebobe.

Cereus belieuli and *C. pugionifer* are two garden names referred here by Schumann (Gesamtb. Kakteen 107. 1897).

Illustrations: Contr. U. S. Nat. Herb. **10**: pl. 21; MacDougal, Bot. N. Amer. Des. pl. 21; Nat. Geogr. Mag. **21**: 705; Journ. Intern. Gard. Club **3**: 16; U. S. Dept. Agr. Bur. Pl. Ind. Bull. **262**: pl. 11, all as *Cereus weberi;* Schelle, Handb. Kakteenk. f. 37; Schumann, Gesamtb. Kakteen f. 24; Möllers Deutsche Gärt. Zeit. **29**: 352. f. 7; 353. f. 8, as *Cereus candelabrum;* Contr. U. S. Nat. Herb. **12**: pl. 71.

Figure 139 is from a photograph taken by Dr. Rose at Tomellín, Mexico, in 1905; figure 140 shows clusters of spines and figure 141 a fruit collected by H. H. Rusby at Cuicatlan, Oaxaca, in 1910.

FIG. 138.—Lemaireocereus deficiens.

FIG. 139.—Lemaireocereus weberi.

15. Lemaireocereus queretaroensis (Weber) Safford, Ann. Rep. Smiths. Inst. **1908**: pl. 6, f. 2. 1909.

Cereus queretaroensis Weber in Mathsson, Monatsschr. Kakteenk. **1**: 27. 1891.
Pachycereus queretaroensis Britton and Rose, Contr. U. S. Nat. Herb. **12**: 422. 1909.

Plant 3 to 5 meters high, with a short woody trunk, much branched above; ribs 6 to 8, prominent, obtuse; areoles about 1 cm. apart, large, brown-woolly, very glandular; spines 6 to 10, at first red, becoming grayish in age, acicular, rather unequal, sometimes only 15 mm. long, at other times 5 cm. long; flowers 7 to 8 cm. long; ovary with many woolly areoles subtended by ovate scales 2 mm. long or less; fruit spiny, edible.

Type locality: Querétaro, Mexico.
Distribution: Central Mexico.

This species was formerly referred by us to the genus *Pachycereus*, but it has since been learned that the fruit is not dry, but juicy and edible, and therefore the plant is more properly a *Lemaireocereus*. Its peculiar glandular areoles are like those of *L. thurberi*, although otherwise the two species are quite different. This plant is said to be cultivated in Jalisco and Querétaro, Mexico, doubtless for its edible fruits, which are also called pitahaya. We have had the plant in cultivation in Washington since 1907, but it has made little or no growth.

Dr. Rose has collected the species at several localities in central Mexico, including the type locality (No. 11133).

Illustrations: Bull. Soc. Acclim. France 52: 18. f. 2, as *Cereus queretaroensis;* Ann. Rep. Smiths. Inst. 1908: pl. 6, f. 2.

Figure 142 shows the spine-bearing stem-areoles of an herbarium specimen collected by Dr. Rose near Querétaro, Mexico, in 1906.

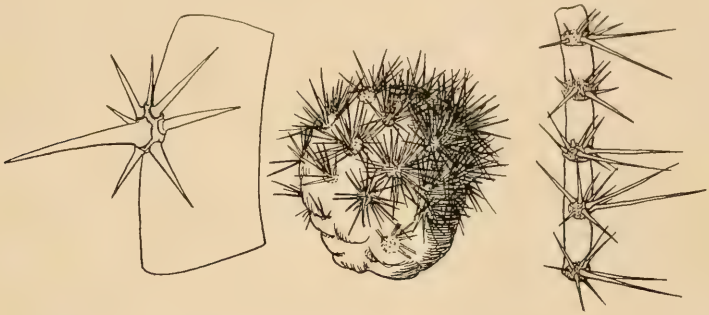


FIG. 140.—Cluster of spines of Lemaireocereus weberi. ×0.7.
FIG. 141.—Fruit of same. ×0.7.
FIG. 142.—Part of rib, showing spine-clusters of Lemaireocereus queretaroensis. ×0.7.

16. Lemaireocereus montanus sp. nov.

Tree-like, 6 to 7 meters high, with a definite smooth trunk 1 meter long or more, with few branches, at first spreading, then nearly erect; ribs few, usually 8, prominent areoles 1 to 1.5 cm. apart, large, filled with short brown wool; spines few, 6 or less, pale in color, rather stout, one of them longer, sometimes 3 cm. long; flowers 6 to 7 cm. long, opening during the day; outer perianth-segments purplish; scales on the ovary ovate, 4 to 6 mm. long, imbricated, acuminate, with erose margins.

This species was found well up on the side of Alamos Mountain, associated with *Lemaireocereus thurberi,* but usually at a higher altitude than that at which that species is generally found. It differs from *L. thurberi* in its habit, number of ribs, armament, and flowers. Like *L. thurberi* it has brown areoles, which are not found in any of the other species except *L. queretaroensis* of the table-land region of central Mexico.

Collected by Rose, Standley, and Russell above Alamos, Mexico, March 18, 1910 (No. 13039).

17. Lemaireocereus thurberi (Engelmann) Britton and Rose, Contr. U. S. Nat. Herb. 12: 426. 1909.

Cereus thurberi Engelmann, Amer. Journ. Sci. II. 17: 234. 1854.
Pilocereus thurberi Rümpler in Förster, Handb. Cact. ed. 2. 689. 1885.
Cereus thurberi littoralis K. Brandegee, Zoe 5: 191. 1904.

Usually without a definite trunk, sending up from the base 5 to 20, or even more, erect or ascending branches 3 to 7 meters high, 15 to 20 cm. in diameter, the basal ones usually simple but occasionally with lateral branches, this doubtless being caused by injuries to the growing tips; ribs numerous, 12 to 17, rather low but sometimes 2 cm. high, rounded, separated by narrow intervals; areoles 10 to 15 or rarely 30 mm. apart, large, sometimes becoming 1 cm. in diameter, circular, brown-felted, more or less glandular, the whole areole becoming a wax-like mass; spines numerous, acicular to subulate, unequal, brownish to black, becoming gray in age, the longest ones sometimes 5 cm. long; flowers mostly borne near the top of the stem but sometimes 3 dm. below the top, 6 to 7.5 cm. long including the ovary, opening during the day; outer perianth-segments broad, reddish, imbricated, gradually passing into the scales on the tube; inner perianth-segments light purple with

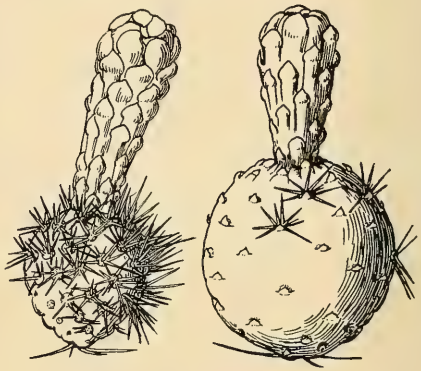
nearly white margins, widely spreading or even turned back at the apex, broad, obtuse; filaments short, numerous, erect, white, borne all over the throat, 2 to 2.5 cm. long; lower part of flower-tube or tube proper smooth within; ovary tuberculate, bearing small, ovate, acute scales, these with white and brown hairs in their axils; fruit globular, 4 to 7.5 cm. in diameter, edible, very spiny, but in age naked, olive without, crimson within; seeds black, shining, 1.8 to 2 mm. long.

Type locality: Canyon near the mountain pass of Bachuachi, Sonora, Mexico.

Distribution: Southern Arizona, in the Comobabi, Quijotoa, and Ajo Mountains, throughout western Sonora, and on both coasts of Lower California. The Index Kewensis says it is from New Mexico, doubtless an error for northern Mexico. In the cape region of Lower California a slender form is found which has been described as a variety.

The flowers, which appear from March to August, are followed by the large delicious fruit much prized by the native, who knows it as pitahaya or pitahaya dulce.

FIG. 143.—Lemaireocereus thurberi.



a *b*

FIG. 144.—L. thurberi: *a*, flower; *b*, fruit. ×0.7.

The species was named for George Thurber (1821–1890), one of the collectors on the first Mexican Boundary Survey.

The habit of branching just at the base is unusual in this genus, in which most of the species have definite, though often short, trunks.

This is the only species of *Lemaireocereus* which reaches the United States and is the only one found in northwestern Mexico or Lower California. Two other species were credited to Lower California in our former treatment (Contr. U. S. Nat. Herb. **12**: 425), but these we now refer to another genus (see pages 115, 116).

Whether the flowers open at night or during the day has been in dispute. Dr. Rose, who studied the species in Lower California, observed the flowers widely expanded at 2 o'clock on a bright sunny day. F. E. Lloyd, in a letter dated September 6, 1909, says, "I notice that what we have hitherto called *Cereus thurberi* is stated by you as having a day-blooming flower. You may recall that I made a special study with reference to this point at the Quijotoa Mountains and found it strictly night-blooming. The photograph which you have of the flower I made between 4 and 5 o'clock in the morning, just before sun-up."

Cereus thurberi monstrosus (E. Dams, Monatsschr. Kakteenk. **14**: 182. 1904) is not an unusual form.

Illustrations: Bull. Soc. Acclim. France 52: f. 4; Cact. Mex. Bound. pl. 74, f. 15; Hornaday, Campfires on Des. and Lava opp. 68, 136; MacDougal, Bot. N. Amer. Des. pl. 8; Monatsschr. Kakteenk. 17: 105, as *Cereus thurberi.*

Figure 143 is from a photograph taken by Dr. MacDougal at Torres, Sonora, in 1902; figure 144*a* shows a flower of the plant collected by F. E. Lloyd on the Quijotoa Mountains, Arizona, in 1906; and figure 144*b* shows a fruit of the same.

18. Lemaireocereus laetus (HBK.) Britton and Rose, Journ. N. Y. Bot. Gard. 20: 157. 1919.

Cactus laetus Humboldt, Bonpland, and Kunth, Nov. Gen. et Sp. 6: 68. 1823.
Cereus laetus De Candolle, Prodr. 3: 466. 1828.

Plant 4 to 6 meters high, much branched, bluish gray but not glaucous; ribs 4 to 8, prominent; areoles 2 to 3 cm. apart; spines brown when young, becoming gray to nearly white in age, usually 1 to 3 cm. but sometimes 8 cm. long, subulate; flowers 7 to 8 cm. long; inner perianth-segments white, 2 cm. long; fruit green without, very spiny, splitting down the side when ripe, white within; pulp edible; seeds black.

Type locality: Near Sondorillo, formerly in Ecuador but now in Peru.
Distribution: Central Peru and southern Ecuador.

Dr. Rose found the species in Catamayo Valley in southern Ecuador, where it is very common (No. 23340); it was, however, seen only in this one locality in Ecuador. We also refer here the plant collected by Dr. and Mrs. Rose along the Rimac River below Matucana, Peru, July 9, 1914 (No. 18650).

FIG. 145.—Lemaireocereus laetus.

FIG. 146.—Lemaireocereus laetus.

We have referred here the plant from Catamayo, as it is the only wild one we know in this region which could possibly have been described as *Cactus laetus.* It is such a conspicuous plant that we do not believe Humboldt would have passed it by without some reference. Through the kindness of Dr. Charles Wood we were able to send to the Natural History Museum of Paris specimens of this Catamayo plant in order to have it compared, if possible, with Humboldt's type. M. Lecomte, however, informs us that no specimen can be found. It is of interest to note that in 1825 Sprengel, who redescribed this species in his edition of the Systema, placed it next to *Cereus eburneus* and questions whether it is not the same as *C. hystrix.*

The original description of *Cactus laetus* is very brief and unsatisfactory.

Figure 145 shows a plant, growing on the flats of the Catamayo Valley, southern Ecuador, photographed by George Rose in 1918; figure 146 is from a photograph taken by Mrs. J. N. Rose at Matucana, Peru; figure 147 shows its flower and figure 148 its fruit.

19. Lemaireocereus cartwrightianus sp. nov.

Plant 3 to 5 meters high, with woody trunk, much branched; branches consisting of short stout joints, 15 to 60 cm. long, 8 to 15 cm. in diameter; ribs 7 or 8; areoles large, brown-felted; young spines white, brown, black, or variegated, about 20, 1 to 2 cm. long, except on the old trunk and here 12 cm. long or more; flowers slender, 7 to 8 cm. long, opening in the early evening; outer perianth-segments narrow, 1 to 1.5 cm. long, reddish, erect; inner perianth-segments small, white except at the spreading tips; filaments numerous, short, included; fruit globular to oblong, 8 to 9 cm. long, covered with clusters of weak spines, deciduous when ripe, red without, white within.

Very common on the flats near Guayaquil; collected by J. N. Rose, J. H. Burns, and George Rose, north of the city, August 11, 1918 (No. 21118). It is characterized by very narrow flowers.

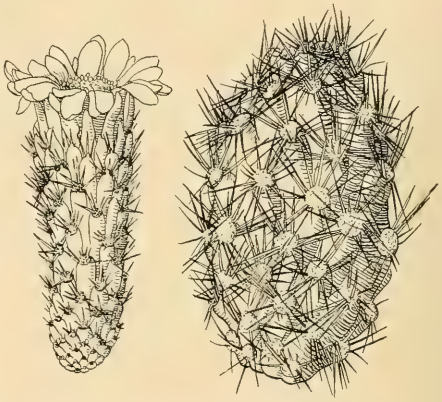


FIG. 147.—Flower of Lemaireocereus laetus. ×0.6.
FIG. 148.—Fruit of same. ×0.6.

FIG. 149.—Lemaireocereus humilis.

It is named for Mr. Alfred Cartwright who has for many years been connected with the British Consular Service at Guayaquil and who has aided many visiting scientists. Mr. Cartwright first described this plant to us and directed us to its peculiar habitat.

20. Lemaireocereus humilis sp. nov.

Stems weak, forming dense thickets, dark green, 1 to 4 meters long, about 4 cm. thick, usually with few branches or none; ribs 3 or 4, sometimes 6, more or less interrupted, little undulate; areoles borne in the depressions of the ribs, large, white-felted, bearing spines only in the lower part; spines 5 to 8, brown, becoming white, acicular, 1 to 2 cm. long; flowers greenish white, about 6 cm. long; outer perianth-segments linear-oblong, spreading; ovary with small scattered scales, at first without spines; fruit very spiny, spherical, 4 cm. long.

FIG. 150.—Flowering branch of Lemaireocereus humilis.

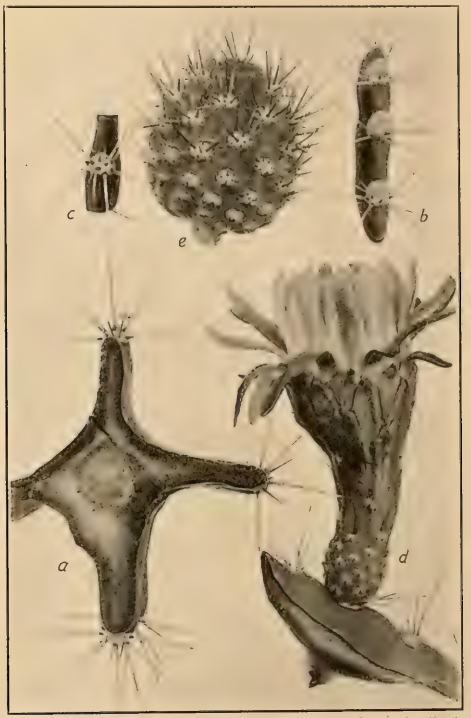


FIG. 151.—L. humilis: *a*, cross-section of stem; *b*, longitudinal section of rib; *c*, cluster of spines; *d*, flower; *e*, fruit.

Collected by H. Pittier at Venticas del Dagua, Dagua Valley, Western Cordillera of Colombia, altitude 700 to 1,000 meters, February 1906, and described from a plant collected by him (New York Botanical Garden, No. 34794) and from his field notes and detailed and habit photographs. It is called tuna colorado.

This plant is quite different from the other species in its slender stems with very few ribs and in its tendency to form dense thickets, but it has the characteristic flower and fruit of this genus.

Figure 149 is from a photograph taken by Henry Pittier at the type locality; figure 150 shows a flowering branch, and figure 151 shows details of the type.

21. Lemaireocereus dumortieri (Scheidweiler) Britton and Rose, Contr. U. S. Nat. Herb. **12**: 425. 1909.

Cereus dumortieri Scheidweiler, Hort. Belge **4**: 220. 1837.

Often tree-like, 6 to 15 meters high, the trunk proper short, 6 to 10 dm. long, 3 dm. in diameter or more, woody; branches many, erect almost from the first, with numerous constrictions, very pale bluish green or somewhat glaucous; ribs generally 6, sometimes 5 or 7, occasionally 9 on very old joints; areoles elliptic, approximate or often confluent, gray-felted; spines various in number and in length, 10 to 20 radials, 1 central or more, the longer ones often 4 cm. long, all at first straw-colored but in age blackened; flowers 5 cm. long, the tube and ovary bearing small ovate scales with bunches of felt and occasionally bristles in their axils, the limb about 2.5 cm. broad; fruit oblong, small, 3 to 4 cm. long, reddish within, not spiny, its areoles nearly contiguous, felted; seeds brownish, 1.5 mm. long, dull, roughened.

Type locality: Incorrectly given as Buenos Aires (see note below).

Distribution: Central Mexico.

Our description is drawn from numerous specimens collected by Dr. Rose in central Mexico. This is the plant which passes as *Cereus dumortieri* in collections, but from the description alone one can hardly be certain. It ranges over a considerable territory, but is never abundant, being found generally as large isolated individuals on the sides of rocky hills and cliffs.

Fig. 153.—Lemaireocereus dumortieri.

Greenhouse plants much resemble *Pachycereus marginatus*, and both species have small flowers; but the wild plants are very unlike and the fruit and seeds differ widely.

Although Scheidweiler in his original description of this species referred it to "Buenos Ayres," he doubtless made a mistake, as he must have done in his reference of *Mammillaria obconella* in the same publication. The original description does not correspond to any known South American cactus, but does represent fairly well our central Mexican species which passes under this name. In 1845 the species was listed by Salm-Dyck (Cact. Hort. Dyck. 1844. 30) as from the Belgian Gardens (H. Belg.). In 1850 (Cact. Hort. Dyck. 1849. 210) he published an original description apparently based on the Belgian specimens; but evidently he had forgotten the older publication. Schumann and most writers since 1850 have assigned Prince Salm-Dyck as the author of this species. Weber (Dict. Hort. Bois 279. 1895) seems to have been the first botanist to refer the species to Mexico.

Fig. 152.—Fruit of Lemaireocereus dumortieri. ×0.8.

Cereus anisacanthus De Candolle (Mém. Mus. Hist. Nat. Paris **17**: 116. 1828) is doubtfully referred here by Schumann. If it should prove to be the same, it would, of course, supplant the present name. Its two varieties, *orthologhus* and *subspiralis* (De Candolle, Mém. Mus. Hist. Nat. Paris **17**: 117. 1828), so far as we can determine, belong here also.

This species is anomalous in *Lemaireocereus*, having very small flowers and spineless fruit, but the scales of the ovary sometimes subtend bristles, if not spines, in their axils.

Illustration: Hort. Belge **4**: pl. 15, as *Cereus dumortieri*.

Plate xv, figure 2, shows the top of a plant brought by Dr. Rose from Cuernavaca, Morelos, Mexico, in 1906. Figure 152 shows the fruit of a plant from Hidalgo; figure 153 is from a photograph taken by him in Hidalgo, Mexico, in 1905.

SPECIES NOT GROUPED.

LEMAIREOCEREUS SCHUMANNII (Mathsson) Britton and Rose, Contr. U. S. Nat. Herb. 12: 425. 1909.

Cereus schumannii Mathsson in Schumann, Monatsschr. Kakteenk. 9: 131. 1899.

Plants tall and stout, 15 meters high, with few branches; ribs 8, thick and high, very obtuse, somewhat pruinose; spines 6 or 7, radial, 1 central, all white with brown tips; flowers and fruit unknown.

Type locality: Honduras.

Distribution: Known only in cultivation.

Little is known regarding this species and from the brief description we are unable to place it definitely in our key. It may be only a form of *L. griseus* so widely cultivated in Mexico and Central America and is near *L. aragonii* and possibly not specifically distinct.

LEMAIREOCEREUS sp.

Cereus rigidispinus Monville, Hort. Univ. 1: 223. 1840.

"Erect, stout, dark green, somewhat glaucous; ribs thick, rounded; sinuses open, deep, acute. Spines very strong and stiff, whitish, divaricate. Trunk 2¼ feet in diameter, having 7 ribs about 9 lines by 5 lines thick at the middle. Areoles 6 to 10 lines apart, a little sunken, subovate, a little convex, covered with a very short grayish nap, bearing 6 to 8 very unequal spines, the strongest, as well as the weakest, arising from no particular point, 3 to 13 lines long and ¼ to 1 line in diameter, all exceedingly stiff, whitish and black at the tip, sometimes 2 centrals or larger ones united along their entire length. Habitat: Mexico. Flowers and fruit unknown. This plant should be placed in Cat. Monv. between *Cer. hystrix* and *eburneus*. In spite of its peculiar appearance, it shows some similarities to them, especially to the latter." (Translated from De Monville, Hort. Univ. 1: 223. 1840.)

Type locality: Mexico.

Schumann refers *Cereus hildmannii* Hortus (Gesamtb. Kakteen 57. 1897) here as a synonym.

LEMAIREOCEREUS sp.

Cereus conformis Salm-Dyck, Cact. Hort. Dyck. 1849. 203. 1850.

Stems erect, robust, 3 dm. high, 10 cm. in diameter, glaucous, green; ribs 7, crenate; areoles 18 mm. apart, orbicular, densely grayish, tomentose; radial spines 7 to 9, 6 to 8 mm. long; central spines 1 to 3, a little stouter than the radial; flowers and fruit unknown.

Type locality: Mexico.

It was sent from Mexico by Ehrenberg to the Berlin Botanical Garden in 1840, but has doubtless long since disappeared. Schumann did not know the species, but Weingart (Monatsschr. Kakteenk. 15: 79. 1905) considers it identical with *Cereus aragonii*. It may be a *Lemaireocereus*, but we doubt its being *L. aragonii*, which is a native of Costa Rica.

LEMAIREOCEREUS sp.

Joints bright green, not at all glaucous; ribs about 2 cm. high, separated by V-shaped intervals; margin of ribs somewhat crenate with the areoles borne at the top of the crenations; radial spines about 8, 1 to 2 cm. long; central spine usually solitary, erect or porrect, sometimes 10 cm. long.

This plant was sent to the New York Botanical Garden by Dr. George F. Gaumer in 1918, but it has not yet flowered (New York Botanical Garden No. 46120). Dr. Gaumer has also sent from Yucatan two other plants which are of this relationship which we are unable to place. His No. 23941 has 7 ribs and numerous short spines; it did not live. His No. 23922 has 10 ribs and also short spines.

13. ERDISIA gen. nov.

Stems much branched at base, sometimes mainly subterranean, the branches slender, erect, ascending, or pendent; ribs few, crenate, with spiny areoles; flowers small, funnelform-campanulate, the tube short; throat short, funnelform, covered with stamens; outer perianth-segments obtuse or sometimes with acute tips; filaments numerous, white, about half the length of the inner perianth-segments; style stout, a half longer than the stamens; ovary tuberculate, bearing minute ovate scales with spines and felt in their axils; fruit juicy, small, globular, bearing clusters of deciduous spines; seeds numerous, minute.

The genus consists of 4 species, so far as known; *Cereus squarrosus* Vaupel is the type species. It is named in honor of Ellwood C. Erdis, who was in charge of the topographical work of the Yale University Peruvian Expedition, 1914.

The plants resemble in habit some of the bushy Cuban species of the genus *Leptocereus*. In the shape of the flowers, the spiny ovary, and the deciduous spines on the fruit, some of them suggest *Echinocereus*, but the habit is very different, and no *Echinocereus* is known to be of South American origin.

KEY TO SPECIES.

Stem and branches cylindric.
- Flowers bright red or scarlet; inner series of stamens not united ..... 1. *E. squarrosa*
- Flowers yellow; inner series of stamens united into a tube ..... 2. *E. philippii*

Branches clavate; stem more or less subterranean.
- Flowers yellow ..... 3. *E. meyenii*
- Flowers purple ..... 4. *E. spiniflora*

1. Erdisia squarrosa (Vaupel).

Cereus squarrosus Vaupel, Bot. Jahrb. Engler **50**: Beibl. **111**: 21. 1913.

Stems 1 to 2 meters long, 1 to 3 cm. in diameter; ribs 8 or 9; areoles 1 to 1.5 cm. apart; spines about 15, yellowish, very unequal, somewhat swollen at base, the longest ones 4 cm. long; flowers borne toward the ends of branches, 2.5 to 4 cm. long including the ovary, sometimes as much as 5 cm. broad; inner perianth-segments 1.5 cm. long; filaments 1 cm. long or less; style stout, 1.5 cm. long; fruit 1.5 to 2 cm. in diameter, juicy, spiny, the clusters of spines falling off early; seeds minute.

FIG. 154.—Erdisia squarrosa.

Type locality: Tarma, Department of Junin, Peru.

Distribution: The highlands of eastern Peru.

This species was collected by Dr. J. N. Rose below Cuzco, Peru, in 1914, when flowers and stems were obtained. Some of the living plants which were sent to the New York

Botanical Garden survived. It was first seen by him about 10 miles below Cuzco, along the railroad running to Juliaca, and was frequently observed a long distance below Cuzco, being easily recognized by its scarlet flowers, which in September were just appearing.

In June 1914, Ellwood C. Erdis collected living specimens 40 miles west of Cuzco, at 2,450 meters altitude, but these died. In November of the same year he again collected the species, this time in flower.

In May 1915, O. F. Cook and G. B. Gilbert collected the plant at Ollantaytambo, Peru, at an altitude of about 3,000 meters. These specimens were accompanied by both flowers and fruit, and some good habit and detail photographs were taken.

Figure 154 is from a photograph taken by O. F. Cook at Ollantaytambo, Peru, in 1915; figure 155 shows portions of the plant photographed.

FIG. 155.—Erdisia squarrosa.

2. Erdisia philippii (Regel and Schmidt).

Cereus philippii Regel and Schmidt, Gartenflora 31: 98. 1882.
Echinocactus philippii Schumann, Gesamtb. Kakteen 427. 1898.
Echinopsis philippii Nicholson, Dict. Gard. Suppl. 338. 1901.

Stems slender, cylindric; ribs 8 to 10, strongly tubercled; radial spines about 8, 10 to 12 mm. long; central spines much stouter and longer, 2.5 cm. long; flowers 4 cm. long, campanulate, yellow below, reddish above; outer segments ovate, acuminate; inner segments oblong, acute; stamens in two distinct series, the outer arising from the base of the segments, the inner series united into a tube around the style; style included; stigma-lobes very short; ovary globular, bearing clusters of acicular spines.

Type locality: Chile.

Distribution: Known only from the type collection.

This species has been described in turn under *Cereus*, *Echinocactus*, and *Echinopsis*, from all of which it is distinct. It is remarkable in having the lower series of stamens united into a tube.

Illustrations: Gartenflora 31: pl. 1079, f. 1, *a*, *b*, as *Cereus philippii*.

3. Erdisia meyenii nom. nov.

Cereus aureus Meyen, Allg. Gartenz. 1: 211. 1833. Not Salm-Dyck, 1828.
Cactus aureus Meyen, Reise 1: 447. 1834.
Echinocactus aureus Meyen in Pfeiffer, Enum. Cact. 68. 1837.
Cleistocactus aureus Weber in Gosselin, Bull. Mens. Soc. Nice 44: 39. 1904.

Stems subterranean, often forming large colonies sending up short, usually unjointed branches; joints 10 to 20 cm. long, 3 to 5 cm. in diameter, more or less clavate; ribs 5 to 8, high (1 cm. high or

more), somewhat undulate; spines several, subulate, unequal, brown to blackish, the longest 5 to 6 cm. long; flowers small, about 4 cm. long, yellow; scales on ovary and flower-tube small, 3 to 4 mm. long, acute, bearing felt and spines in their axils; fruit 2 cm. in diameter, reddish.

Type locality: Cordilleras de Tacna, Chile (formerly Peru), 600 meters altitude.

Distribution: Northern Chile and near Arequipa, Peru.

Dr. Rose found this plant (No. 18801) very common on the dry hills just below Arequipa, Peru, growing mostly underground. The separated branches at first seemed to represent distinct plants; it is inconspicuous, its purple stems with black spines resembling a dead plant.

Meyen's Travels is usually cited as the original place of publication for this species, but it was published a year earlier as *Cereus aureus*. This last combination has usually been credited to Schumann (Gesamtb. Kakteen 124. 1897). The name assigned to this plant being a homonym, we have renamed it for its discoverer, Franz Julius Ferdinand Meyen (1804–1840), a celebrated traveler and writer.

Figure 156 shows a branch collected by Dr. Rose near Arequipa, Peru, in 1914.

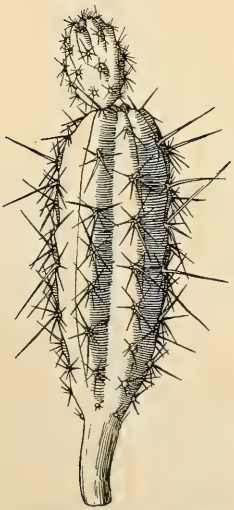


FIG. 156.—Branch of E. meyenii. ×0.5.

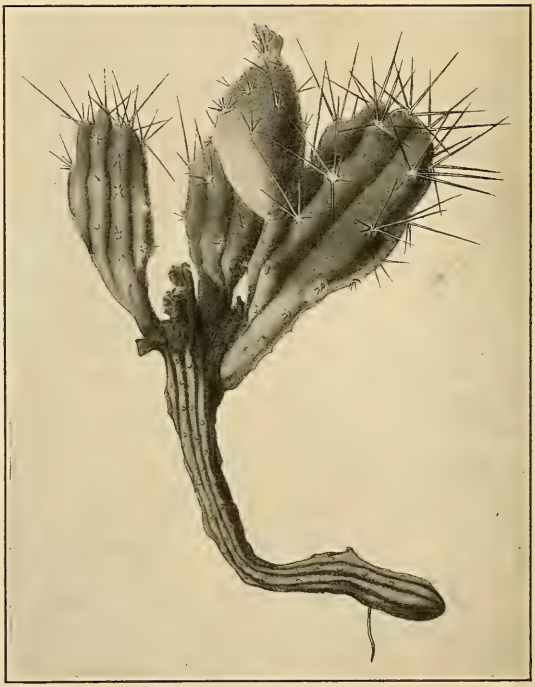


FIG. 157.—Erdisia spiniflora.

4. Erdisia spiniflora (Philippi).

Opuntia spiniflora Philippi, Linnaea **30**: 211. 1859.
Opuntia bicolor Philippi, Linnaea **33**: 83. 1864.
Opuntia clavata Philippi, Anal. Univ. Chile **41**: 722. 1872. Not Engelmann, 1848.
Cereus hypogaeus Weber in Regel, Gartenflora **31**: 165. 1882.
Echinocereus hypogaeus Rümpler in Förster, Handb. Cact. ed. 2. 784. 1885.
Eulychnia clavata Philippi in Engler and Prantl, Pflanzenfam. 3^{6a}: 185. 1894, as synonym.
Echinocereus clavatus Schumann, Monatsschr. Kakteenk. **5**: 123. 1895.

Underground stems slender, spineless, branching near the surface of the ground; branches somewhat clavate, becoming bronzed, 6-ribbed; spines all black at base, brown at tip; radial spines about 6, acicular, central spine solitary, porrect, slender; flowers probably purplish, 5 to 6 cm. long, with a rather broad throat; fruit fleshy, spiny; seeds not known.

Type locality: Near Aranas, Santiago, Chile.

Distribution: High mountains of Chile, near Santiago.

This species has been described under four specific names, and has been referred to four genera. We refer it to *Erdisia* on account of floral similarity to *E. squarrosa.*

Illustrations: Gartenflora **21:** pl. 721, f. 3, as *Opuntia clavata;* Gartenflora **31:** pl. 1085, as *Cereus hypogaeus.*

Figure 157 is a copy of the first illustration above cited.

PUBLISHED SPECIES, PERHAPS OF THIS GENUS.

CEREUS APICIFLORUS Vaupel, Bot. Jahrb. Engler **50:** Beibl. **111:** 15. 1913.

Prostrate or ascending, the stems 2 to 2.5 cm. thick, about 10, spreading; central spine solitary, 2 to 3 times as long as the radials; flowers numerous, forming a crest at the top of the plant, 4 cm. long; ovary terete, 1 cm. long, covered with numerous small lanceolate scales bearing brown felt and reddish-brown bristles in their axils.

Type locality: Valley of Puccha River, Department of Ancachs, Peru.

The author compares the flowers of this plant with those of *Cereus aureus* Meyen.

14. **BERGEROCACTUS** Britton and Rose, Contr. U. S. Nat. Herb. **12:** 435. 1909.

Low, much branched cactus, with stout, cylindric, spreading or ascending branches; ribs many, low; areoles approximate; spines many, yellow, acicular; flower small, pale yellow, with short tube and widely expanded limb; scales on ovary and flower-tube small, bearing felt and spines in their axils; perianth-segments small, obtuse; fruit globose, densely spiny; seeds obovate.

FIG. 158.—Bergerocactus emoryi.

The genus is monotypic; it is named in honor of Alwin Berger, author of an excellent discussion of the genus *Cereus*, who was long in charge of the garden of Sir Thomas Hanbury at La Mortola, Italy.

1. Bergerocactus emoryi (Engelmann) Britton and Rose, Contr. U. S. Nat. Herb. **12**: 435,* 474. 1909.

Cereus emoryi Engelmann, Amer. Journ. Sci. II. **14**: 338. 1852.
Echinocereus emoryi Rümpler in Förster, Handb. Cact. ed. 2. 804. 1885.

Branches 2 to 6 dm. long, 3 to 6 cm. in diameter, entirely covered with the dense spiny armament; ribs 20 to 25, very low, only a few millimeters high, somewhat tuberculate; spines 10 to 30, yellow to yellowish brown, acicular, 1 to 4 cm. long; flowers about 2 cm. long and about as broad when expanded; outer perianth-segments obovate, obtuse; inner perianth-segments oblong, about 1 cm. long.

Type locality: "About the boundary line" of California and Lower California.

Distribution: Near the coast of southwestern California and northwestern Lower California and adjacent islands.

Illustration: Engelmann, Cact. Mex. Bound. pl. 60, f. 1 to 4, as *Cereus emoryi*.

Figure 158 is from a photograph taken by E. O. Wooton on San Clemente Island, California, in 1912; figure 159 shows a dried flower collected by Le Roy Abrams at Tia Juana, San Diego County, California, in 1903.

FIG. 159.—Flower of B. emoryi. ×0.8.

15. LEOCEREUS gen. nov.

Stems long and slender, nearly terete, somewhat vine-like in habit; ribs numerous, but low and indistinct; areoles approximate, bearing acicular spines and felt, but no wool or hairs; flowers axillary, solitary, small, narrowly campanulate, with a short limb; ovary and flower-tube very scaly, the scales bearing numerous silky hairs and bristly spines in their axils; fruit small, globular; seeds black, shining, pitted.

In its narrow flower, in the hairs in axils of the scales on the ovary and tube, this genus suggests *Oreocereus*, but is very different in habit. The flower of *Leocereus* is different from that of *Nyctocereus* in its narrow throat, short perianth-segments, hairy and bristly areoles.

The genus is named for Señor A. Pacheco Leão, Director, Jardim Botanico, Rio de Janeiro, Brazil. The first of the 3 species here described is taken as the type.

KEY TO SPECIES.

Flowers 4 cm. long; spines yellowish brown ..... 1. *L. bahiensis*
Flowers 6 to 7 cm. long; spines dark chestnut-brown.
  Axils of scales on ovary densely lanate; fruit villous ..... 2. *L. melanurus*
  Axils of scales on ovary sparsely lanate; fruit nearly naked ..... 3. *L. glaziovii*

1. Leocereus bahiensis sp. nov.

Somewhat branched, sometimes erect, sometimes clambering, up to 2 meters long, 1 to 1.5 cm. in diameter; ribs 12 to 14, low; areoles close together, circular, bearing white felt and spines; spines numerous, the central ones much longer than the radials, often 3 cm. long, acicular, yellowish, spreading; flowers 4 cm. long, densely woolly and spiny; inner perianth-segments small, white; fruit 10 to 12 mm. in diameter; seeds 1.5 mm. long.

Living and dried flowers of this species were obtained from the Horto Florestal, Joazeiro, Brazil, through Dr. L. Zehntner (No. 266, type); later Dr. Rose obtained more material at Barrinha, Bahia, Brazil, and living plants were sent to the New York Botanical Garden; in October 1917 Dr. Zehntner obtained fruit in the Chique-Chique district of Bahia.

*By typographical error *Bergerocereus*.

It is called, in Bahia, rabo de raposa and tail of the fox.

Figure 160 is from a photograph of a plant collected by Dr. Rose in Bahia in 1915; figure 161 shows a flower of an herbarium specimen received from Dr. Zehntner.

2. Leocereus melanurus (Schumann).

Cereus melanurus Schumann in Martius, Fl. Bras. 4^2: 200. 1890.

Stems more or less cespitose from fibrous roots, slender, 1 meter long or more, 2 to 2.5 cm. in diameter; ribs 12 to 16, low, only 2 to 3 mm. high; branches 10 to 40 cm. long, often short-jointed, 2 to 2.5 cm. in diameter; areoles approximate, 2 to 5 mm. apart, white-felted when young; spines numerous, very unequal; lower radials about 20, white, bristle-like, 5 to 8 mm. long; upper radial spines and centrals about 15, all brown, stouter than the lower radials and a little longer, except that 1 or sometimes 2 of the centrals are much elongated (3 to 5 cm. long); flower narrow, 5 to 6 cm. long, somewhat enlarged above, appearing in December; flower-tube 4 to 5 cm. in diameter, covered with closely appressed hairs; perianth-segments narrow, erect, acute; seeds 1.5 mm. long, brownish.

Type locality: Serra de S. João del Ray, Brazil.

Distribution: Minas Geraes, Brazil.

The above description is drawn from the original of Schumann, supplemented by notes from specimens collected in Minas Geraes, Brazil, by Campos Porto and sent to Washington by Dr. A. Löfgren in 1917. These specimens differ considerably in habit from the plant as originally described, but since they come from near the type locality and have the same ribs and spines we believe we are justified in so referring them.

Illustration: Martius, Fl. Bras. 4^2: pl. 39, as *Cereus melanurus*.

Figure 162 is copied from the illustration above cited.

FIG. 160.—Leocereus bahiensis.

3. Leocereus glaziovii (Schumann).

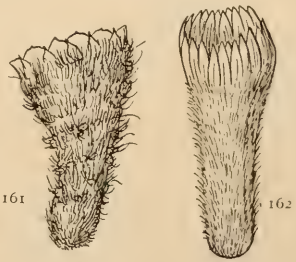
Cereus glaziovii Schumann in Martius, Fl. Bras. 4^2: 200. 1890.

Stems erect, with somewhat spreading branches, 1.5 to 2 cm. in diameter; ribs 12, low; areoles a little longer than broad; spines 20 to 30, subulate, brownish, 1.5 to 2.5 cm. long; flowers 6 cm. long, funnelform; inner perianth-segments white, 2.5 to 3.5 cm. long, 5 mm. broad, acuminate; stamens included; scales of the ovary woolly in their axils; fruit narrowly oblong, 2 cm. long, 5 mm. in diameter; seeds small, black.

Type locality: Near Pico d'Itabira do Campo.

Distribution: Known only from the type locality.

Cereus glaziovii Schumann was placed by K. Schumann next to *C. melanurus* Schumann, and is probably congeneric with it; its flowers are similar, but the ovary and fruit are not spiny. It is known only from the collection made by Glaziou in the State of Minas Geraes, Brazil, near Pico d'Itabira do Campo.



161 162

FIG. 161.—Flower of L. bahiensis. ×0.9.

FIG. 162.—Flower of L. melanurus. ×0.9.

LEOCEREUS ? sp.

Rootstock 1 to 2 dm. broad, flattened, shallow-seated; stems several, erect or ascending, unbranched, up to 1 meter long or more, 3 to 4 cm. in diameter; ribs 13 to 15, low, 3 to 4 mm. high; areoles close together, 3 to 4 mm. apart, brown-felted when young; spines yellowish, 20 or more, acicular, about 1 cm. long; flowers said to be tubular, 2.5 to 3 cm. long, somewhat hairy; perianth-segments white.

Collected by Campos Porto, on the Serra do Ouro Branco, Minas Geraes, Brazil, December 1916.

This plant was collected for *Cereus melanurus*, but it is too tall and stout and has different spines and smaller flowers. We have living specimens of this plant collected by Señor Porto, but they have not yet flowered in cultivation.

16. **WILCOXIA** Britton and Rose, Contr. U. S. Nat. Herb. **12**: 434. 1909.

Plants usually low and weak, producing a cluster of dahlia-like roots; stems very slender, more or less branched, the branches often only the diameter of a lead pencil; ribs few and low; spines of all the areoles similar; flowers diurnal, funnelform-campanulate, red or purple, large for the size of the plant, only 1 from an areole, the tube rather short, its areoles bearing spines or bristles and wool; areoles of the ovary and fruit bearing spines or bristles and wool; seeds black; aril large, basal.

Type species: *Echinocereus poselgeri* Lemaire.

Four species, of Texas and Mexico, compose the genus as known.

The type species has been included in *Echinocereus*, but its habit is very unlike that genus, while the second and third species have been considered as belonging to *Cereus* proper.

The genus was named for General Timothy E. Wilcox, U. S. A., who for many years has been an enthusiastic student of plants.

KEY TO SPECIES.

Areoles on ovary and flower-tube bearing long bristles.
- Stems puberulent ..... 1. *W. viperina*
- Stems glabrous.
  - Corolla about 5 cm. long; tube indefinite; seeds dull; spine-clusters approximate, 3 to 5 mm. apart. . 2. *W. poselgeri*
  - Corolla 10 to 12 cm. long; tube definite; seeds shining; spine-clusters distant, 7 to 15 mm. apart. . 3. *W. striata*

Areoles on ovary and lower part of flower-tube without long bristles ..... 4. *W. papillosa*

1. **Wilcoxia viperina** (Weber) Britton and Rose, Contr. U. S. Nat. Herb. **16**: 242. 1913.

Cereus viperinus Weber in Gosselin, Bull. Mus. Hist. Nat. Paris **10**: 385. 1904.

Stems elongated, branching, the largest ones seen 1 cm. in diameter and becoming spineless; branches densely velvety-puberulent, 8 mm. in diameter or less; ribs about 8, inconspicuous; spines about 8, appressed, dark, about 5 mm. long; flowers red, about 3 cm. long; spines of ovary and corolla-tube black, bristle-like, intermixed with long white wool.

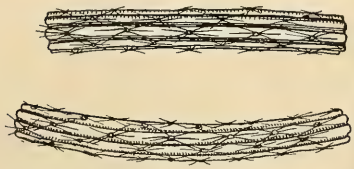


FIG. 163.—Sections of stem of W. viperina. × 0.8.

Type locality: Zapotitlan, Mexico.

Distribution: Southern Puebla, Mexico.

The type of this species was collected by L. Diguet and is now in the

FIG. 164.—Wilcoxia poselgeri.

Herbarium of the Museum of Paris, where it was examined by Dr. Rose in 1912. It is the same as C. A. Purpus's No. 3301 collected at the type locality in 1908 and distributed in his sets of specimens. It is called in Mexico organito de vibora.

The plant is remarkable among *Cereeae* in having puberulent stems. We include it in *Wilcoxia*, but are uninformed as to the characters of the roots, which are tuberous in the other species.

Figure 163 shows pieces of the stem, from an herbarium specimen collected by C. A. Purpus at the type locality.

2. Wilcoxia poselgeri (Lemaire) Britton and Rose, Contr. U. S. Nat. Herb. **12**: 434. 1909.

Cereus tuberosus Poselger, Allg. Gartenz. **21**: 135. 1853. Not Pfeiffer, 1837.
Echinocereus poselgeri Lemaire, Cact. 57. 1868.
Echinocereus tuberosus Rümpler in Förster, Handb. Cact. ed. 2. 783. 1885.
Cereus poselgeri Coulter, Contr. U. S. Nat. Herb. **3**: 398. 1896.

Roots tuberous, black, several, near the surface of the ground; stems 60 cm. high or less, 6 to 10 mm. thick, with 8 to 10 inconspicuous ribs, the lower and older parts naked, spiny above, the spines almost hiding the ribs; radial spines 9 to 12, appressed, 3 to 5 mm. long, delicate, puberulent; central one ascending, black-tipped, about 1 cm. long, stouter than the radials; flowers purple or pink, 5 cm. long, spines of ovary and flower-tube intermixed with white hairs; perianth-segments linear, acuminate, about 2.5 cm. long, widely spreading or strongly recurved; style pale green; stigma-lobes slender, green; seeds pitted or rugose, 8 mm. long.

Type locality: Texas.

Distribution: Southern Texas and Coahuila.

This cactus does not grow well on its own roots in greenhouse cultivation, but gradually loses its vitality; we have had plants, however, to persist in cultivation for ten years. If grafted on cuttings of *Selenicereus pteranthus*, very vigorous plants can be developed, which will flower each year. It is sometimes called sacasil.

The flowers open in the afternoon, but close at night, opening and closing in this way for from 5 to 9 days. They have a pleasing odor.

Illustrations: Monatsschr. Kakteenk. **13**: 77; Knippel, Kakteen pl. 15; Blühende Kakteen **1**: pl. 38; Schelle, Handb. Kakteenk. f. 53, as *Echinocereus tuberosus;* Engelmann, Cact. Mex. Bound. pl. 59, f. 12; Goebel, Pflanz. Schild. **1**: pl. 4, f. 1; Blanc, Cacti 38. f. 348, 349, as *C. tuberosus*.

Fig. 165.—Cluster of tuberous roots of W. poselgeri. ×0.6.

Figure 164 is from a photograph of a flowering plant in the collection of the New York Botanical Garden; figure 165 shows the cluster of tuberous roots of a plant grown at Floral Park, New York, in 1890.

3. Wilcoxia striata (Brandegee) Britton and Rose, Contr. U. S. Nat. Herb. **12**: 434. 1909.

Cereus striatus Brandegee, Zoe **2**: 19. 1891.
Cereus diguetii Weber, Bull. Mus. Hist. Nat. Paris **1**: 319. 1895.

Roots brownish, deep-seated; stem vine-like, very slender, usually with 9 indistinct ribs, grayish; spines about 9, 1.5 to 3 mm. long, acicular, weak, appressed, brownish, the areoles rather distant; flowers 10 to 12 cm. long, purple, the areoles bearing slender, bristle-like spines and long wool; fruit pyriform, 3 to 4 cm. long, scarlet, spiny, the spines deciduous; seeds minutely pitted.

Type locality: San José del Cabo, Lower California.

Distribution: Lower California and Sonora, Mexico.

The natives call it pitayita, pitahayita, sacamatraca, saramatraca, and jaramataca.

This differs from the type species of the genus in its much larger, funnelform flowers.

4. **Wilcoxia papillosa** sp. nov.

Tap-root spindle-shaped, fleshy, 4 to 7 cm. long, 2 cm. in diameter, this giving off long fibrous roots; stems slender with few branches, 3 to 4 dm. long, perhaps longer, 3 to 5 mm. in diameter, glabrous, but the whole surface covered with minute papillæ; ribs low, indistinct, perhaps 3 to 5; areoles small, distant, 1 to 3 cm. long, white-woolly; spines in clusters of 6 to 8, minute, yellowish brown, bulbose at base, 1 to 3 mm. long; flowers scarlet, 4 to 5 cm. long; scales on the ovary and flower-tube small, linear-cuspidate, the lower ones naked or nearly so, those at the top of the tube with long white wool and several brown bristles (8 to 12 mm. long) in their axils; perianth-segments 2 cm. long; fruit probably spineless.

Collected by C. A. Purpus at Culiacan, Sinaloa, Mexico, October 1, 1904, and now deposited in the Herbarium of the University of California (No. 160654), and in the same State at Tinamaxtita, San Ignacio, altitude 1,340 meters, May 20, 1919, by a Mexican Commission which was studying the natural resources of Sinaloa (No. 848).

The plant is called cardoncillo.

17. **PENIOCEREUS** (Berger) Britton and Rose, Contr. U. S. Nat. Herb. **12**: 428. 1909.

Plants low, slender, from an enormous, fleshy, turnip-shaped root; stems and branches usually 4 or 5-angled, rarely 3 or 6-angled; spines of all the areoles similar; flowers very large for the size of the plant, funnelform, nocturnal, white, the outer perianth-segments tinged with red; tube of flower long, slender, with long hairs in the axils of the upper scales, but with clusters of spines on the lower part as also on the ovary; fruit spiny, ovoid, long-pointed, bright scarlet, fleshy, and edible; seeds black, rugose, with a large oblique hilum.

A monotypic genus of the southwestern United States and northern Mexico.

The generic name is from the Greek, signifying thread-cereus.

1. **Peniocereus greggii** (Engelmann) Britton and Rose, Contr. U. S. Nat. Herb. **12**: 428. 1909.

Cereus greggii Engelmann in Wislizenus, Mem. Tour North. Mex. 102. 1848.
Cereus pottsii Salm-Dyck, Cact. Hort. Dyck. 1849. 208. 1850.
Cereus greggii transmontanus Engelmann, Proc. Amer. Acad. **3**: 287. 1856.
Cereus greggii cismontanus Engelmann, Proc. Amer. Acad. **3**: 287. 1856.
Cereus greggii roseiflorus Kunze, Monatsschr. Kakteenk. **20**: 172. 1910.

Root often very large, sometimes 6 dm. in diameter, weighing 60 to 125 pounds, usually 15 to 20 cm. long by 5 to 8 cm. in diameter; stems 3 dm. to 3 meters high, 2 to 2.5 cm. in diameter, the young parts pubescent; spines small, blackish; radials 6 to 9; central usually 1, sometimes 2; flower 15 to 20 cm. long, the tube slender and terminating in a short funnelform throat, covered with stamens; inner perianth-segments lanceolate, acute, 4 cm. long, spreading, or the outer ones reflexed; filaments erect, exserted; style slender, the stigma-lobes about 1 cm. long; fruit tuberculate, 12 to 15 cm. long, including the elongated beak.

Type locality: Near Chihuahua, Mexico.

Distribution: Western Texas, southern New Mexico and Arizona to Sonora, Chihuahua, and Zacatecas.

FIG. 166.—Peniocereus greggii.

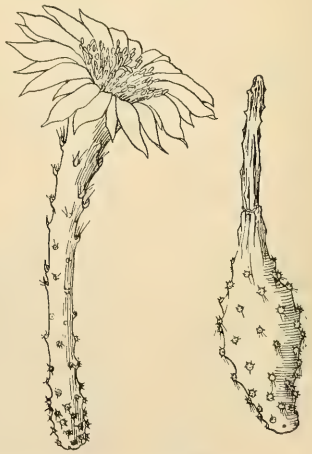


FIG. 167.—Flower of Peniocereus greggii. ×0.5.
FIG. 168.—Fruit of same. ×0.5.

In the southwest it is called deerhorn cactus or night-blooming cereus.

The petals were first described as pale purple, but this was probably incorrect.

The species is found occasionally in valleys and on mesas in its range, but is never abundant. It is hard for the novice to find, as the short, dull-colored stems resemble dead sticks or the common sage bush, while the large flowers appear only at night.

Mrs. W. R. Kitt informs us that in cultivation this plant sometimes reaches a height of 6 feet. About Tucson, Arizona, it flowers usually between June 12 and 16 and many of the flowers appear on the same night everywhere throughout the desert. The flowers are extremely fragrant and collectors are thus guided when searching for the plants.

Illustrations: Gard. Chron. III. 34: f. 43; Cact. Emory's Exped. 157. b 6; Förster, Handb. Cact. ed. 2. f. 14, 94; Monatsschr. Kakteenk. 5: 150, 151; 14: 135; Schumann, Gesamtb. Kakteen f. 18; Cact. Mex. Bound. pl. 63, 64; Schelle, Handb. Kakteenk. f. 23, as *Cereus greggii*; Cact. Mex. Bound. pl. 65, as *Cereus greggii transmontanus*; Contr. U. S. Nat. Herb. 12: pl. 74, 75.

Figure 166 is from a photograph taken at night by F. E. Lloyd at Tucson, Arizona; figure 167 shows a flower and figure 168 a fruit collected by F. E. Lloyd near Tucson.

18. DENDROCEREUS gen. nov.

Tree-like, with a thick, upright, terete trunk crowned with numerous erect or pendent branches; branches 3 to 5-flanged; ribs thin and high, very spiny; areoles without long hairs; flowers nocturnal, broadly funnelform, the perianth finally falling from the ovary by abscission; tube of flower subcylindric, narrowed below, bearing short, often reflexed scales, the lower ones subtending short spines; perianth-segments numerous, spreading; stamens numerous, somewhat exserted; ovary with few areoles, these often bearing a few spines; fruit indehiscent, globular, naked, green, hard, with a very thick outer wall; seeds brownish, roughened, truncate at base.

A monotypic genus of Cuba. The name is from the Greek, meaning tree-cereus, this cactus being, in outline, more like a tree than any other.

1. Dendrocereus nudiflorus (Engelmann).

Cereus nudiflorus Engelmann in Sauvalle, Anal. Acad. Cienc. Habana 6: 98. 1869.

Plant often 7 to 10 meters high, with a definite woody trunk and a very large, much branched top; trunk 1 meter long or more, up to 6 dm. in diameter, with a solid wood core, the bark close, grayish brown, armed with 3 to 5 rows of clusters of spines, sometimes borne on rounded knobs; spines pale gray, stout but acicular, 8 cm. long or less; branches dull green, when young weak, 3 to 5-winged, made up of numerous short joints, with a very slender woody axis, about 12 cm. thick; ribs or wings 4 to 7 cm. high, with low crenate margins; areoles 5 to 50 mm. apart, felted, on branches rather large, sometimes spineless, sometimes bearing 2 to 15 spines, these acicular, sometimes 4 cm. long, with black tips; flowers 10 to 12 cm. long, borne near the tops of the terminal joints, the wall of the flower-tube thick and firm; the flower-bud nearly erect, subcylindric, narrowed at base, with a few scattered areoles below the middle, ovoid-conic, blunt-pointed, viscid, shining, green streaked with brown; areoles of the ovary bearing tufts of white wool and usually 1 to 3 short black spines; outermost segments of the perianth triangular, reflexed; outer segments linear-oblong, greenish yellow, blunt, 2 to 3 cm. long, the inner narrowly oblong, white, 4 cm. long; stamens numerous, borne on the elongated throat, slightly exserted; style very thick, 5 to 6 mm. in diameter, entirely filling the tube proper, 2.5 cm. long; stigma-lobes numerous; fruit globular or longer than thick, sometimes pointed, 8 to 12 cm. long, smooth, greenish, naked, with a very thick tough rind 10 to 15 mm. thick; seeds 3 mm. long.

Type locality: Flats around Habana, Cuba.

Distribution: Coast of Habana, Matanzas, Santa Clara, and Oriente provinces, Cuba.

Dendrocereus nudiflorus is one of the most striking and interesting of all cacti. Many individuals have the general aspect of apple trees and one realizes that it is a cactus only by rather close observation. It grows in level ground, wherever observed by us, often densely surrounded by trees and bushes of various kinds. Dr. Howe's photograph, here

reproduced (see fig. 169), was obtained only after cutting away a large number of bushes in order to place the camera.

The Cuban name for this plant is flor de copa.

Illustrations: Contr. U. S. Nat. Herb. 12: pl. 49 to 51; Journ. N. Y. Bot. Gard. 10: f. 19; Roig, Cact. Fl. Cub. pl. 2, as *Cereus nudiflorus*.

Plate XIV, figures 1 and 2, show branch and flower of the plant as it flowered at the New York Botanical Garden in 1911. Figure 169 is from a photograph taken by Marshall A. Howe at Guantánamo Bay, Cuba, in 1909; figure 170 shows a fruit collected by N. L. Britton and Percy Wilson at Punta Colorado, Cienfuegos Bay, Cuba, in 1910.

FIG. 169.—Dendrocereus nudiflorus.

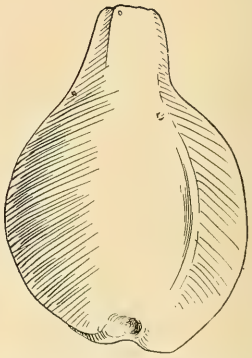


FIG. 170.—Fruit of D. nudiflorus. ×0.5.

19. MACHAEROCEREUS gen. nov.

Plants prostrate or low and bushy, often with long horizontal or prostrate stout branches, very spiny throughout; ribs low; areoles large, felted, and spiny; spines numerous, the centrals flattened and dagger-like; flowers diurnal, 1 at an areole, long, slender, funnelform, the perianth persisting on the fruit; stamens numerous, borne on the narrow elongated throat; ovary and lower part of flower-tube bearing many small scales, these subtending felted areoles which afterwards bear clusters of spines; fruit globular, edible when young, covered with clusters of spines, but when fully mature becoming naked; seeds dull black, somewhat punctate, acute on the back.

In its fruit this genus is nearest *Lemaireocereus*, to which we once referred its two species; the perianth, however, is much more elongated and more persistent; in habit and shape of spines the species are very different from any of *Lemaireocereus*.

Two species, natives of Lower California, are recognized, of which *Cereus eruca* Brandegee is the type.

The generic name is from the Greek, signifying dagger-cereus, with reference to the dagger-like spines.

KEY TO SPECIES.

Prostrate, the tips ascending; flowers yellow.....1. *M. eruca*
Bushy, erect, 1 meter high or less; flowers purple.....2. *M. gummosus*

M. E. Eaton del.

1. Part of branch of *Dendrocereus nudiflorus*.
2. Flowering branch of the same.
3. Flowering branch of *Nyctocereus guatemalensis*.

(Natural size.)

1. Machaerocereus eruca (Brandegee).

Cereus eruca Brandegee, Proc. Calif. Acad. II. 2: 163. 1889.
Lemaireocereus eruca Britton and Rose, Contr. U. S. Nat. Herb. 12: 425. 1909.

Prostrate, except the erect or ascending tips; branches 1 to 3 meters long, 4 to 8 cm. in diameter, usually simple, rooting on the under surface, dying at the older end and growing forward at the other; sometimes several plants starting as branches from a common parent as a center and first radiating out, then dying at the rear; ribs about 12; areoles large, 2 cm. apart; spines about 20, very unequal, pale gray, the outer ones terete, the inner ones stout and flatter, the longest about 3 cm. long; flowers 10 to 12 cm. long, described as yellow; tube about 10 cm. long, nearly 6 mm. in diameter; limb 4 to 6 cm. broad; ovary very spiny; fruit spiny, 4 cm. long; seeds black.

Type locality: Magdalena Island, Lower California.
Distribution: Lower California.

The plant is known in Lower California as chirinola and creeping devil cactus. Mr. Brandegee describes it as follows:

"Its manner of growth with uplifted heads and prominent reflexed spines gives the plants a resemblance to huge caterpillars."

While this resemblance is true of the plants when growing in the open, it is especially striking when the plant meets with some obstruction such as a log or large stone. Then it raises its head, crawls up one side and down the other, and finally by the dying of the rear virtually passes over the obstruction.

FIG. 171.—Machaerocereus eruca.

Mr. E. A. Goldman (Contr. U. S. Nat. Herb. 16: 352, 353. 1916) speaks of it as follows:

"We first saw this remarkable cactus on the coastal plain near Santo Domingo, about 30 miles north of Matancita and here made a collection. From this point southward it was noted at intervals on the plains as far as the Llano de Yrais and on the lower and more sandy parts of Magdalena Island. The stems grow 1 to 3 meters in length and are nearly prostrate, and from this habit and their long whitish recurved spines have aptly been likened to huge caterpillars. The growing ends of the branches stand up from the ground, but progressive growth leaves the main body lying prostrate. The stems become rooted along the lower sides and gradually die behind, resulting in a slow progression of the living portion along the ground. Multiplication of individuals frequently results from the decay of connecting parts. In some places disconnected plants forming a hollow circle can be traced by the remains of dead trunks to a common center. The plants show a

preference for soft parts of the coastal plain and grow usually in groups, often topping a slight eminence formed of wind-drifted material. These cactuses serving as a sand binder and preventing erosion tend to favor further accumulations. The desert foxes (*Vulpes macrotis devius*) of the region find congenial burrowing places among the procumbent trunks."

Illustrations: Monatsschr. Kakteenk. **5**: 71; Proc. Calif. Acad. II. **2**: pl. 7; Schumann, Gesamtb. Kakteen f. 29; Nat. Geogr. Mag. **22**: 466, as *Cereus eruca;* Contr. U. S. Nat. Herb. **16**: pl. 127, as *Lemaireocereus eruca.*

Figure 171 is from a photograph taken by E. A. Goldman at Santo Domingo, Lower California; figure 172 is from a photograph of a plant collected by C. R. Orcutt at Magdateria Bay, Lower California.

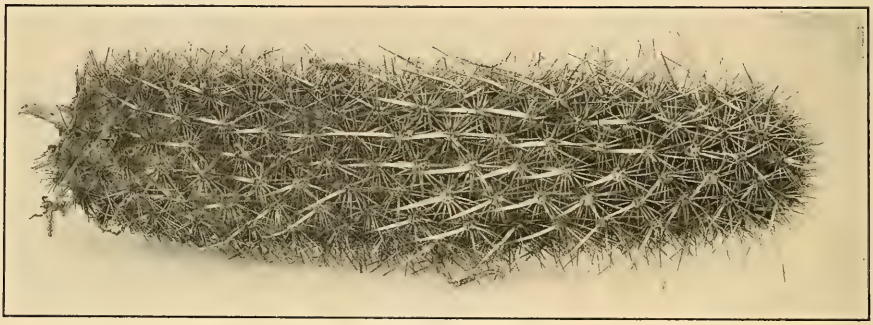


FIG. 172.—Machaerocereus eruca.

2. Machaerocereus gummosus (Engelmann).

Cereus gummosus Engelmann in Brandegee, Proc. Calif. Acad. II. **2**: 162. 1889.
Cereus cumengei Weber, Bull. Mus. Hist. Nat. Paris **1**: 317. 1895.
Cereus flexuosus Engelmann in Coulter, Contr. U. S. Nat. Herb. **3**: 411. 1896.
Lemaireocereus cumengei Britton and Rose, Contr. U. S. Nat. Herb. **12**: 424. 1909.
Lemaireocereus gummosus Britton and Rose, Contr. U. S. Nat. **12**: 425. 1909.

Erect or ascending, but usually not a meter high, or with long, spreading, sometimes prostrate, branches, the whole plant sometimes having a spread of 6 to 7 meters; branches 4 to 6 cm. in diameter; ribs usually 8, rarely 9, low and obtuse; areoles rather large, about 2 cm. apart; spines stout, the radials 8 to 12, somewhat unequal, about 1 cm. long; central spines 3 to 6, stout, flattened, one much longer than the others and about 4 cm. long; flowers 10 to 14 cm. long, the tube long and slender; inner perianth-segments 2 to 2.5 cm. long, purple; stamens about as long as the segments; fruit subglobose, 6 to 8 cm. in diameter, spiny; skin of fruit bright scarlet; pulp purple; seeds rugose, pitted, 2.5 mm. long.

Type locality: Lower California.

Distribution: Lower California and adjacent islands.

Dr. Rose, who visited Lower California in 1911, found this the most widely distributed there of all the cacti. He observed it at all stations visited on the main peninsula and on all the islands of the Gulf of California except Tiburon and Estaban. The plant is rather diverse in its habit; it often sends out long horizontal branches which take root and start other colonies. In habit it much resembles *Rathbunia alamosensis,* but is usually stouter and less gregarious. The

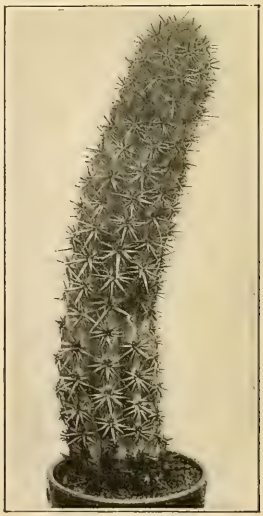


FIG. 173.—M. gummosus.

fruit is called pitahaya agre or pitahaya agria and is probably the most valuable fruit of Lower California. A fish poison is prepared by bruising the stems. The mashed pulp is then thrown into a running stream.

FIG. 174.—Machaerocereus gummosus.

FIG. 175.—Flower of M. gummosus. ×0.6.

Cereus gummatus, *C. gumminosus*, and *C. pfersdorffii* Hildmann (Schumann, Gesamtb. Kakteen 125. 1897) are only garden names of this species.

Illustrations: Grässner, Haupt-Verz. Kakteen 3; Monatsschr. Kakteenk. 13: 105, both as *Cereus gummosus;* Contr. U. S. Nat. Herb. 16: pl. 126 A, as *Lemaireocereus gummosus.*

Figure 173 is from a photograph of a plant collected by Dr. Rose at Santa Maria Bay in 1911; figure 174 is from a photograph taken by E. A. Goldman on Esperito Santo Island, Lower California, in 1906; figure 175 shows a flower drawn from an herbarium specimen obtained from C. R. Orcutt, collected in northern Lower California.

20. **NYCTOCEREUS** (Berger) Britton and Rose, Contr. U. S. Nat. Herb. 12: 423. 1909.

Erect or clambering, slender, sparingly branched cacti, with cylindric, ribbed stems and branches; ribs numerous, low; areoles each bearing a tuft of short white wool and small radiating acicular bristles or weak spines; flowers large, white, nocturnal; ovary bearing small scales, short or long wool, and tufts of weak spines or bristles; perianth funnelform, gradually expanding above, bearing scales and tufts of weak bristles below the middle, above the middle bearing narrowly lanceolate scales distant from each other and grading into the blunt outer perianth-segments; inner perianth-segments widely spreading, obtuse or acutish; stamens numerous, shorter than the perianth; style about as long as the stamens; fruit fleshy, scaly, spiny or bristly; seeds large, black.

Type species: *Cereus serpentinus* De Candolle.

Nyctocereus was considered by A. Berger a subsection of his subgenus *Eucereus* but his conception of it was of a complex, from which we would exclude all but three of the species which he referred to it. He speaks of certain forms in the type species which have smaller flowers and no fruit; this variation we have also noticed in *N. guatemalensis.*

The name is from the Greek, meaning night-cereus. Five species are here recognized, natives of Mexico and Central America.

Key to Species.

Flower-tube longer than the limb.....1. *N. serpentinus*
Flower-tube not longer than the limb.
  Flowers 4 to 7 cm. long.
    Spines acicular; ribs acute.....2. *N. hirschtianus*
    Spines subulate; ribs obtuse.....3. *N. guatemalensis*
  Flowers 9 cm. long or more.
    Perianth-segments long-acuminate.....4. *N. neumannii*
    Perianth-segments acute or obtusish.....5. *N. oaxacensis*

1. Nyctocereus serpentinus (Lagasca and Rodrigues) Britton and Rose, Contr. U. S. Nat. Herb. **12**: 423. 1909.

Cactus serpentinus Lagasca and Rodrigues, Anal. Cienc. Nat. Madrid **4**: 261. 1801.
Cactus ambiguus Bonpland, Descr. Pl. Rares 90. 1813.
Cereus serpentinus De Candolle, Prodr. **3**: 467. 1828.
Cereus ambiguus De Candolle, Prodr. **3**: 467. 1828.
Cereus serpentinus stellatus Lemaire, Cact. Gen. Nov. Sp. 78. 1839.
Cereus serpentinus splendens Salm-Dyck in Lemaire, Cact. Gen. Nov. Sp. 79. 1839.
*Cereus splendens** Salm-Dyck, Cact. Hort. Dyck. 1849. 214. 1850.
Echinocereus serpentinus Lemaire, Cact. 57. 1868.
Echinocereus splendens Lemaire, Cact. 57. 1868.
Cereus serpentinus albispinus† Weingart, Monatsschr. Kakteenk. **18**: 30. 1908.

Stems growing in a cluster or clump, at first erect, then clambering through bushes or over walls or, when without support, creeping or hanging, often 3 meters long, 2 to 5 cm. in diameter; ribs 10 to 13, low and rounded; areoles close together, felted and with acicular or bristle-like spines; spines about 12, white to brownish, the tips usually darker, the longest about 3 cm. long; flowers borne at the upper areoles, sometimes terminal, 15 to 19 cm. long, the limb 8 cm. broad; areoles on ovary and flower-tube bristly; inner perianth-segments white, spatulate, obtuse; fruit red, covered with deciduous spines, 4 cm. long; seeds black, 5 mm. long.

Type locality: Not cited; described from a garden plant.

Distribution: Mexico, probably native near the eastern coast.

Cereus serpentinus strictior Walpers (Repert. Bot. **2**: 278. 1843) is only a published name.

Cereus ambiguus strictior (Weingart, Monatsschr. Kakteenk. **19**: 9. 1909) seems never to have been published.

Cereus kalbreyerianus Wercklé (Monatsschr. Kakteenk. **17**: 38. 1907) is known only from its flowers, which, from the description, closely resemble those of *N. serpentinus* and it is said to resemble this species in its habit. It was found near Bogotá, Colombia.

Although Mexico is given as the home of this species, no wild specimens have been collected there in recent times; it is now widely cultivated in that country, or is half-wild in hedges or running over walls about yards. A. Berger (Rep. Mo. Bot. Gard. **16**: 75, 76, 1905) has this interesting note:

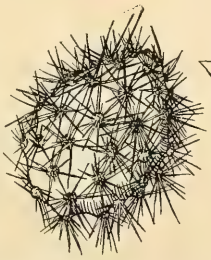


Fig. 176.—Fruit of Nyctocereus serpentinus. ×0.7.

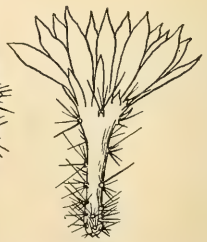


Fig. 177.—Flower of Nyctocereus hirschtianus. ×0.7.

"*Cereus serpentinus* P. DC. possesses the largest seeds of *Cereus* known to me. There are only a few in each fruit, bedded in the crystalline red pulp. Several varieties of this species occur in gardens. There are two very pronounced forms at La Mortola. One has weaker and more serpentine stems, with smaller spines and smaller flowers. This never produces any fruit. The other form has stronger, upright stems with longer spines. Its flowers are remarkably larger and produce a great quantity of fruits. The former variety seems to have undeveloped stigmata, and it may prove to be the male plant. Similar cases of heterogamy are known in *Opuntia* and *Mammillaria*, but nothing of the kind has ever been shown in *Cereus*. This male form at La Mortola corresponds well with the figure in the Botanical Magazine, pl. 3566. Strictly terminal flowers, as shown in this plate, are also occasionally produced by our plant."

*We have followed Weingart (Monatsschr. Kakteenk. **18**: 30. 1908) in referring this name here rather than to *Monvillea cavendishii*.

†Weingart states that this and *Cereus albispinus* are identical with *Cereus splendens*.

M. E. Eaton del

1. Top of branch of *Eulychnia iquiquensis*.
2. Top of stem of *Lemaireocereus dumortieri*.
3. Part of flowering stem of *Nyctocereus serpentinus*.

(Natural size.)

Known in Mexico as junco or junco espinoso.

Illustrations: Link and Otto, Ic. Pl. Select. pl. 42, as *Cactus serpentinus;* Bonpland, Descr. Pl. Rares pl. 36; Van Geel, Sert. Bot. 3: pl. 17, the last two as *Cactus ambiguus;* Abh. Bayer. Akad. Wiss. München **19:** pl. 2; Cact. Journ. **1:** 59; Curtis's Bot. Mag. **64:** pl. 3566; Dict. Gard. Nicholson **1:** f. 410; Förster, Handb. Cact. ed. 2. f. 95; Gartenflora **31:** pl. 1079, f. 2. c; Mém. Mus. Hist. Nat. Paris **17:** pl. 12; Rep. Mo. Bot. Gard. **16:** pl. 11, f. 1 to 3; Rümpler, Sukkulenten f. 65, as *Cereus serpentinus.*

Plate XV, figure 3, shows the flower of a plant in the collection of the New York Botanical Garden. Figure 176 shows the fruit collected in Mexico by H. H. Rusby in 1910.

2. **Nyctocereus hirschtianus** (Schumann) Britton and Rose, Contr. U. S. Nat. Herb. **12:** 424. 1909.

Cereus hirschtianus Schumann, Gesamtb. Kakteen 130. 1897.

Stems columnar, erect, slender, 10 mm. in diameter; ribs 10, somewhat acute, 3 mm. high; radial spines 7 to 9, slender, 4 to 5 mm. long; central spines 1 to 5, the lower one stouter and porrect; flowers probably white, 5 to 6 cm. long, funnelform; perianth-segments spreading, acute; stamens numerous, somewhat exserted; ovary and tube very spiny; fruit not known.

Type locality: Nicaragua.

Distribution: Known only from the type locality.

This species differs from *N. guatemalensis* in its habit, more slender stem, its spines, which are much more slender and delicate but not as long, and its smaller flowers. Weingart has written extensively (Monatsschr. Kakteenk. **23:** 108 to 111. 1913) about this species, reaching the conclusion that it and *N. guatemalensis* are the same. We have both types before us, and feel convinced that the species are distinct.

Illustration: Schumann, Gesamtb. Kakteen f. 31, as *Cereus hirschtianus.*

Figure 177 shows the flower of a cotype specimen in the herbarium of the United States National Museum.

3. **Nyctocereus guatemalensis** Britton and Rose, Contr. U. S. Nat. Herb. **16:** 240. 1913.

Cereus guatemalensis Vaupel, Monatsschr. Kakteenk. **23:** 86. 1913.

Stems half erect, arching, creeping, or even prostrate, 1 meter long or longer, 3 to 6 cm. in diameter; ribs 8 to 12, very low; radial spines about 10; central spines 3 to 6, usually much longer than the radials, the longer ones 3 to 4 cm. long; flowers very fragrant, 4 to 7 cm. long; ovary somewhat tuberculate, each tubercle crowned by an areole bearing a bunch of pinkish or brownish spines; outer perianth-segments brownish; inner perianth-segments lanceolate, acute, nearly white; stamens much shorter than the perianth, attached all along the surface of the wide throat; style stout, 3 cm. long; fruit about 2 cm. long, spiny; seeds black, shining, 3 mm. in diameter.

Type locality: El Rancho, Guatemala.

Distribution: Guatemala.

Illustrations: Monatsschr. Kakteenk. **19:** 167, as *Cereus hirschtianus;* Contr. U. S. Nat. Herb. **16:** pl. 70, 71.

Plate XIV, figure 3, shows a part of the type specimen, which flowered at the New York Botanical Garden in 1915. Figure 178 is from a photograph of another part of the type specimen.

4. **Nyctocereus neumannii** (Schumann) Britton and Rose, Contr. U. S. Nat. Herb. **12:** 424. 1909.

Cereus neumannii Schumann in Loesener, Bot. Jahrb. Engler **29:** 99. 1900.

Stems columnar, up to 1 meter long, 3 cm. in diameter, ascending or decumbent; ribs 13, somewhat crenate; spines 10 to 14, radials and centrals similar, acicular, up to 4 cm. long, grayish, brownish when young; flower 10 cm. long; ovary tuberculate, bearing felt and brown or reddish spines in its areoles; inner perianth-segments white, lanceolate, long-acuminate.

Type locality: Near Chiquitillo, Metagalpa, Nicaragua.

Distribution: Known only from the type locality.

The plant is known to us only from description.

5. Nyctocereus oaxacensis sp. nov.

Stems branching, slender, 2 to 3 cm. in diameter; ribs 7 to 10, rather low; areoles 10 mm apart; radial spines 8 to 12, 4 to 15 mm. long, slender, brownish; centrals 3 to 5; flowers 8 to 10 cm. long, "whitish inside, dirty purplish or reddish outside"; perianth-segments linear to oblong, rounded at apex; stamens not extending nearly as far as the perianth-segments; ovary densely covered with brownish bristly spines.

Collected by E. W. Nelson about Lagunas, Oaxaca, Mexico, altitude 255 meters, June 5, 1895 (No. 2543, type).

We refer here tentatively another specimen also collected by Mr. Nelson near Huilotepec, Oaxaca, altitude 30 meters, May 4 to 11, 1895 (No. 2585).

FIG. 178.—Nyctocereus guatemalensis, as it flowered in Washington.

21. BRACHYCEREUS gen. nov.

Stems low, forming candelabrum-like masses; branches numerous, cylindric; ribs many, low, with closely set areoles bearing felt and numerous acicular spines; flowers narrow-funnelform, bearing small scales which subtend large spiny areoles; outer perianth-segments lanceolate; inner perianth-segments very narrow, long-acuminate, described as possibly white but more likely yellow; filaments very short; ovary obliquely subglobose, bearing scattered spiny areoles; fruit ellipsoid, very spiny, but in age probably naked.

The name is from the Greek, meaning short-cereus.

Only one species is known, native of the Galápagos Islands.

1. Brachycereus thouarsii (Weber).

Cereus thouarsii Weber, Bull. Mus. Hist. Nat. Paris **5**: 312. 1899.
Cereus nesioticus Schumann in Robinson, Proc. Amer. Acad. **38**: 179. 1902.

Stems 6 to 10 dm. high; branches numerous, radiating and ascending, 3 to 5 cm. in diameter, entirely covered by a mass of yellow spines; ribs about 20, low, 3 mm. high; areoles 5 to 6 mm. apart; spines about 40, unequal, the longer ones about 3 cm. long, bristle-like; flower 7 cm. long; outer perianth-segments 1.5 cm. long, 2 mm. broad; inner perianth-segments longer than the outer, narrow; filaments 1 mm. long or less; fruit 2.5 to 4 cm. long, 1.3 cm. in diameter; seeds numerous, 1.2 mm. long, ellipsoid, brownish, slightly punctate.

Type locality: Charles Island, Galápagos.

Distribution: Albemarle, Abingdon, Chatham, James, Charles, and Tower Islands, Galápagos.

We have identified *Cereus thouarsii* Weber, by photographs of the specimens sent by Professor Agassiz to Dr. Engelmann, preserved at the Missouri Botanical Garden, and mentioned by Dr. Weber at the place of first publication.

Schumann says this species is a very peculiar one, "from its long, brown, non-pungent spines, which clothe the stem so densely that its surface is invisible. I have never before seen a species of the genus with such short filaments as in this. The petals are also uncommonly narrow."

Berger refers this species to his subsection *Nyctocereus*, with which it is probably most nearly related. It was named for Abel Aubert Du Petit-Thouars (1793–1864).

Illustration: Proc. Calif. Acad. Sci. IV. 1: pl. 5, as *Cereus nesioticus*.

Figure 179 shows the flower of the type specimen of *Cereus nesioticus* preserved in the Gray Herbarium; figure 180 shows the fruit of *Brachycereus thouarsii* collected by A. Stewart, preserved in the herbarium of the California Academy of Sciences.

FIG. 179.—Flower of B. thouarsii. ×0.8.

FIG. 180.—Fruit of same species. ×0.8.

22. **ACANTHOCEREUS** (Berger) Britton and Rose, Contr. U. S. Nat. Herb. 12: 432. 1909.

Weak, elongated, many-jointed cacti, at first erect but soon clambering or trailing, the joints usually strongly 3-angled, sometimes 4 or 5-angled, in one species sometimes 7-angled, the seedlings and juvenile branches not as strongly angled, with more ribs and with different spines; areoles bearing short wool or felt and several stiff spines; flowers funnelform, nocturnal, 1 at an areole; flower-tube remaining rigid after anthesis, gradually drying and remaining on the ripe fruit, green, rather slender, expanded toward the summit, bearing a few areoles similar to those of the branches, subtended by small scales; limb somewhat shorter than the tube, widely expanded; outer perianth-segments narrowly lanceolate to linear, acuminate, green, shorter than the white, inner segments; stamens not extending as far as perianth-segments, attached all along the upper half of the tube or throat; style very slender, divided at the apex into several linear stigma-lobes; fruit spiny or naked, with a thick, dark-red skin breaking irregularly from top downward; flesh red; seeds numerous, black.

This genus has a wide distribution; its species are usually found at low altitudes in semiarid regions, especially about the Gulf of Mexico and the Caribbean Sea; although occurring on the coasts of Texas and Florida and recorded from Cuba, it has not been reported from any of the other larger Antilles, but is represented on the Venezuelan and Colombian coasts and also in Central America and Brazil. It is found not only on the east and west coasts of Mexico but also in the interior.

The type of this genus is based on the *Cactus pentagonus* of Linnaeus. Linnaeus in his Species Plantarum cites no definite habitat for it, while his description is very meager. His earlier reference in Hortus Cliffortianus (182. 1737), although somewhat fuller, is still uncertain. It is there stated that the ribs are 5, sometimes 6. Most of the species of this genus, especially those which would have been known in Linnaeus's time, usually have 3 ribs, occasionally 4, rarely 5. The young plants and the young growth, however, often have 5 and 6 ribs, which would account for variations in descriptions of the same species.

Curiously enough, the type species is one of the species of Linnaeus which Miller omits in his Gardener's Dictionary (1768).

Cereus pellucidus Pfeiffer (Enum. Cact. 108. 1837), which we formerly referred to this genus (Contr. U. S. Nat. Herb. **12**: 432), following previous authors, is to be looked for in *Leptocereus*. Both Schumann and Berger regard this group as consisting of but a single species, the former placing it with *Cereus greggii* in his series *Acutangules*, and the latter in a subsection *Acanthocereus*; Pfeiffer, on the other hand, recognized several species as belonging to this group; we distinguish at least 7. The name is from the Greek, meaning thorn-cereus.

Key to Species.

Ribs usually 3, rarely 4, thick.
- Joints 8 to 10 cm. wide, deeply crenate; spines very stout, subulate.
  - Spines 1 to 6; perianth-tube about 7 cm. long ..... 1. *A. horridus*
  - Spines about 10, the outer 5 to 8, very short; perianth-tube about 12 cm. long ..... 2. *A. colombianus*
- Joints 2 to 8 cm. wide, low-crenate; spines slender.
  - Spines well developed, subulate ..... 3. *A. pentagonus*
  - Spines short or none, when present acicular ..... 4. *A. subinermis*

Ribs 4 to 7, mostly thin.
- Plants green.
  - Spines up to 7 cm. long; ribs 3 to 5 ..... 5. *A. occidentalis*
  - Spines 3 cm. long or less; ribs 5 to 7 ..... 6. *A. brasiliensis*
- Plants bluish white; joints 4-angled; spines 2 to 6, the longest 2 cm. long ..... 7. *A. albicaulis*

1. Acanthocereus horridus sp. nov.

Plants stout, the joints strongly 3-angled or 3-winged, the young growth 5 or 6-angled; wings with deep undulations; areoles large, 3 to 6 cm. apart; spines brown or blackish when young; radial spines 1 to 6, very short, conic, less than 1 cm. long; central spine usually 1, sometimes 2, often very stout and elongated, sometimes 8 cm. long; flower, including the ovary, 18 to 20 cm. long; tube 4 cm. long, including the funnelform throat 12 cm. long; throat 4 cm. broad at mouth; outer perianth-segments linear, brown or greenish, 6 cm. long; inner perianth-segments 3 to 4 cm. long; stamens white; style thick, cream-colored; fruit 3.5 cm. long, light red, glossy, covered with large areoles bearing white felt; skin thick, finally splitting as the fruit ripens; pulp red.

Collected in Guatemala by F. Eichlam in 1909 (New York Botanical Garden No. 34788). It has frequently flowered in cultivation, both at Washington and at New York.

Here we are disposed to refer E. W. Nelson's plant from San Juan Guichicovi, Oaxaca, Mexico, collected June 21 to 24, 1895 (No. 2729).

Figure 181 shows a part of a joint of the type specimen.

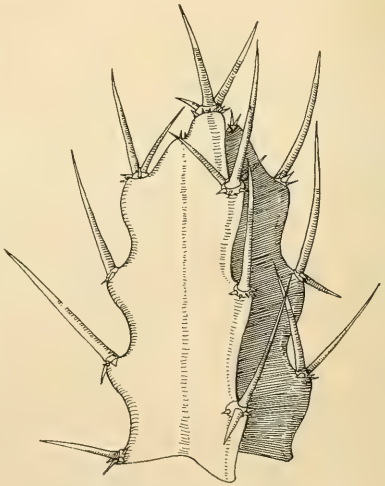


Fig. 181.—Part of joint of A. horridus. ×0.4.

2. Acanthocereus colombianus sp. nov.

Erect, branching dichotomously, 2 to 3 meters high; joints about 9 cm. wide, strongly 3-winged; areoles large, 5 cm. apart; radial spines 5 to 8, very short, less than 5 mm. long; central spines 1 or 2, very stout, 4 to 5.5 cm. long; flower 25 cm. long, white, with a rather stout tube 12 cm. long, the gradually expanded throat 5 to 6 cm. long.

Collected by Francis W. Pennell and Henry H. Rusby near Calamar, Colombia, July 10, 1917 (No. 23, type), and by Herbert H. Smith near Bonda, Colombia, in 1898–1899 (No. 2423). According to Mr. Smith this species grows in dry forests and thickets at low altitudes; here it is known as pitahaya.* His

*Pitahaya is a well-known name in tropical America for many species of cacti, especially of *Cereus* and its relatives, of which there are various spellings, such as pitajaya, pitajuia, pitalla, pitaya, and pithaya. Several suffixes are sometimes used with it, as pitahaya agre, pitahaya agria, pitahaya de San Juan, and pitahaya dulce, and it has the diminutives pitayita and pitahayita.

plant comes from near the type locality of *Cactus pitajaya* Jacquin, but we refer that species to *A. pentagonus*, also found in northern Colombia.

The species is near *A. horridus*, but has a much longer flower-tube.

3. Acanthocereus pentagonus (Linnaeus) Britton and Rose, Contr. U. S. Nat. Herb. **12**: 432. 1909.

Cactus pentagonus Linnaeus, Sp. Pl. 467. 1753.
Cactus pitajaya Jacquin, Enum. Pl. Carib. 23. 1761.
Cereus pentagonus Haworth, Syn. Pl. Succ. 180. 1812.
Cactus prismaticus Willdenow, Enum. Pl. Suppl. 32. 1813.
Cereus prismaticus Haworth, Suppl. Pl. Succ. 77. 1819.
Cereus pitajaya De Candolle, Prodr. **3**: 466. 1828.
?*Cereus undulosus* De Candolle, Prodr. **3**: 467. 1828.
?*Cactus undulosus* Kosteletzky, Allg. Med. Pharm. Fl. **4**: 1393. 1835.
Cereus cognatus Pfeiffer, Enum. Cact. 106. 1837, as synonym.
Cereus acutangulus Otto in Pfeiffer, Enum. Cact. 107. 1837.
Cereus princeps Pfeiffer, Enum. Cact. 108. 1837.
Cereus ramosus Karwinsky in Pfeiffer, Enum. Cact. 108. 1837.
Cereus baxaniensis Karwinsky in Pfeiffer, Enum. Cact. 109. 1837.
Cereus variabilis Engelmann, Bost. Journ. Nat. Hist. **5**: 205. 1845. Not Pfeiffer, 1837.
Cereus nitidus Salm-Dyck, Cact. Hort. Dyck. 1849. 211. 1850.
Cereus vasmeri Young, Fl. Texas 276. 1873.
Cereus dussii Schumann, Gesamtb. Kakteen 89. 1897.
Cereus sirul Weber in Gosselin, Bull. Mus. Hist. Nat. Paris **10**: 384. 1904.

Stem clambering, usually 2 to 3, sometimes 7 meters high, but when growing in the open more or less arched and rooting at the tips, then making other arches and thus forming large colonies; old trunk becoming nearly round, 5 cm. in diameter or more, covered with a thick mucilaginous, spineless cortex and a hard-wood axis with only a small pithy cavity; joints 3 to 8 cm. broad, 3 to 5-angled, low-crenate; juvenile growth nearly terete, with 6 to 8 low ribs, approximate areoles and numerous short acicular spines; areoles on normal branches 3 to 5 cm. apart; spines gray, acicular to subulate, various; radials at first 6 or 7, 1 to 4 cm. long; central spine often solitary, longer than the radials; spines of old areoles often as many as 12, of which several are centrals; flowers 14 to 20 cm. long; tube and ovary bearing conspicuous areoles with brown felt and several subulate spines; outer perianth-segments green; inner perianth-segments white, acuminate; fruit oblong, red, edible; cotyledons broadly ovate, 5 to 8 mm. long, thick, united at base, gradually passing below into the spindle-shaped hypocotyl.

Type locality: America, but no definite locality cited.

Distribution: Keys of southern Florida; coast of Texas, south along the eastern coast of Mexico to Guatemala and Panama; the coasts of Colombia and Venezuela and Guadeloupe. Introduced on St. Thomas and St. Croix. Recorded from Cuba.

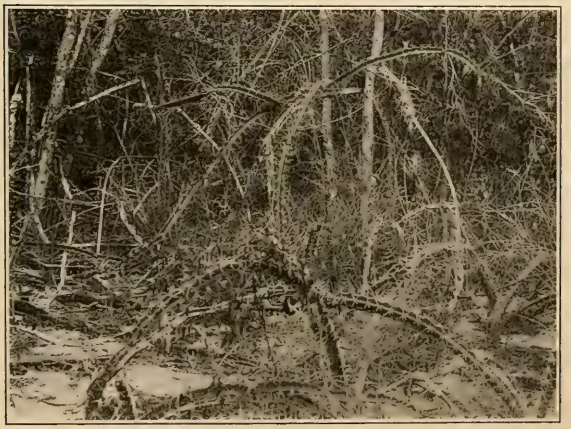


FIG. 182.—Acanthocereus pentagonus.

FIG. 183.—Acanthocereus pentagonus.

As understood by us this species varies greatly in the relative thickness of its branches, in armament, and in the size of its flowers. Its geographical range is, in our conception, greater than that of most cacti.

Cereus baxaniensis ramosus (Salm-Dyck in Walpers, Repert. Bot. 2: 277. 1843) is published only as a synonym. *Cereus arcuatus* Zuccarini (Monatsschr. Kakteenk. 14: 55. 1904) from its description is of this relationship. It was originally collected at Totolapa, Mexico, by Zuccarini.

Cereus bajanensis Wercklé (Monatsschr. Kakteenk. 15: 166. 1905) was never described but belongs here. *Cereus quadrangularis* Haworth (Syn. Pl. Succ. 181. 1812; *C. trigonus quadrangularis* Pfeiffer, Enum. Cact. 118. 1837; *Cactus quadrangularis* Loudon, Encycl. Pl. 412. f. 6876. 1829) may belong here, but Pfeiffer referred it with a question to *Cereus caripensis* De Candolle (Prodr. 3: 467. 1828; *Cactus caripensis* Humboldt, Bonpland, and Kunth, Nov. Gen. et Sp. 6: 66. 1823), but this species was referred by Schumann to the genus *Rhipsalis*.

FIG. 184.—Acanthocereus pentagonus in cactus plantation of Charles Deering at Buena Vista, Florida, May 1918.

Cereus undulatus Pfeiffer (Enum. Cact. 107. 1837), based on a specimen in the Dresden Garden, is usually referred to *Cereus acutangulus*, but was not described by Pfeiffer at the place here cited.

A specimen in the Berlin Garden also was called *Cereus undulatus* by D. Dietrich (Syn. Pl. 3: 104. 1843) and described, but should be referred elsewhere. It is of quite different relationship, being very slender, dull green, 10-ribbed. The flowers are large, 12.5 cm. in diameter, white. Its native habitat is unknown.

Illustrations: Cact. Journ. 1: 125; Cact. Mex. Bound. pl. 60, f. 5, 6, all these as *Cereus variabilis*; Monatsschr. Kakteenk. 13: 158; Rev. Hort. Belge 40: after p. 184; Tribune Hort. 4: pl. 140, as *Cereus baxaniensis*.

Plate XVI, figure 1, shows a flower and part of a joint of a plant sent from the Berlin Botanic Garden to the New York Botanical Garden. Figure 182 is from a photograph

1. Top of flowering branch of *Acanthocereus pentagonus*.
2. Top of flowering branch of *Acanthocereus subinermis*.
3. Top of a fruiting branch of *Acanthocereus subinermis*.

(All natural size.)

taken by Marshall A. Howe on Boot Key, Florida, in 1909; figure 183 shows the fruit and withering perianth of a specimen collected by Dr. Rose at Laredo, Texas, in 1906; figure 184 is from a photograph by J. K. Small of a plant in the cactus plantation of Charles Deering, Buena Vista, Miami, Florida, May 1918, originally brought from Sands Key in 1917.

4. **Acanthocereus subinermis** sp. nov.

Plants 1 meter high or higher; joints stout, 5 to 7 cm. broad, strongly 3 or 4-angled, bright green, somewhat shining, usually short; areoles 3 to 4 cm. apart; spines either wanting or short, when present 6 to 10 at an areole, acicular, usually less than 1.5 cm. long; flowers various in size, 15 to 22 cm. long; outer perianth-segments narrow, reddish, acute; inner perianth-segments white; areoles of ovary and flower-tube somewhat spiny; fruit globular to short-oblong, 4 cm. long, dull red.

Collected by J. N. Rose between Mitla and Oaxaca City, Mexico, September 6, 1908 (No. 11304). It has since been grown in Washington and in the New York Botanical Garden, where it has frequently flowered and fruited.

Plate XVI, figure 2, represents a flowering joint of the type specimen, and figure 3 shows its fruit.

5. **Acanthocereus occidentalis** sp. nov.

Stems rather weak, forming dense thickets; branches slender, 4 to 5 cm. in diameter, 3 to 5-angled, dull green, often bronzed; margins of ribs slightly sinuate; areoles 1 to 3 cm. apart, filled with short brown wool; spines numerous, nearly equal, yellowish, acicular, up to 7 cm. long; flowers 14 to 18 cm. long; fruit unknown.

Common on the western coast of Mexico, where it was frequently collected by Rose, Standley, and Russell at the following places: San Blas, Sinaloa, March 24, 1910 (No. 13431, type); Mazatlan, April 4, 1910 (No. 14050); Guadalupe, April 18, 1910 (No. 14752); and by Dr. Rose at Rosario in 1897 (No. 3170).

This species is widely separated geographically from the others of this genus, being confined to low thickets along the coast of Sinaloa, western Mexico.

Figure 185 shows part of a joint of a plant brought by Dr. Rose from Sinaloa in 1910.

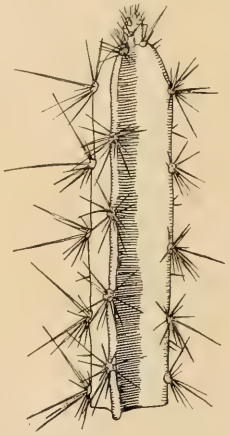


FIG. 185.—Joint of Acanthocereus occidentalis. ×0.5.

6. **Acanthocereus brasiliensis** sp. nov.

Stems weak, at first erect but soon prostrate or clambering over bushes, usually much branched at base, bright green, somewhat shining; ribs 5 to 7, high and thin, slightly undulate; areoles small, 2 to 4 cm. apart; spines numerous, acicular, white with brown tips, 3 cm. long or less; flowers about 15 cm. long; buds acuminate; outer perianth-segments linear; ovary bearing clusters of acicular spines; fruit globular, slightly tuberculate, 8 cm. in diameter, green, covered with clusters of acicular deciduous spines; pulp greenish white; seeds few, large, brownish.

Common in thickets in the subarid parts of Bahia, Brazil, where it was frequently observed by Dr. Rose in 1915; the type is from Machado Portella (No. 19903).

This species not only is out of the range of the preceding species of this genus, but is otherwise somewhat anomalous, for it normally has more ribs and these of different texture. The fruit, too, is much larger than that of the other species, is covered with deciduous spines, and has a greenish white pulp.

Figure 186 is from a photograph taken by Paul G. Russell at the type locality in 1915.

7. **Acanthocereus (?) albicaulis** sp. nov.

A low, weak plant, although erect at first, a meter high or less, afterward elongating and arching; branches few, usually sharply 4-angled, 1 to 3 cm. broad, bluish white, the margins only slightly

undulate; areoles 2 to 3 cm. apart, small, brown-felted; spines 2 to 6, acicular, brown, swollen at base, unequal, the longest 2 cm. long; flowers and fruit unknown.

Collected near Barrinha, Bahia, Brazil, by Rose and Russell, June 8, 1915 (No. 19808).

This is a very distinct and remarkable plant. In the shape and color of the branches it suggests some species of *Hylocereus* such as *H. ocamponis*, but it is a true terrestrial and never develops aërial roots. It is inconspicuous, growing in the bushy flats, and easily overlooked. Numerous cuttings were sent to the New York Botanical Garden by Dr. Rose, but only one of these lived, and this has not yet made any new growth. It may not be of this genus, for it does not resemble closely any of the described species.

Figure 187 is from a photograph taken by Paul G. Russell in 1915 at the type locality.

FIG. 186.—Acanthocereus brasiliensis.

FIG. 187.—Acanthocereus (?) albicaulis.

DESCRIBED SPECIES, PERHAPS OF THIS GENUS.

CEREUS TENELLUS Salm-Dyck in Pfeiffer, Enum. Cact. 109. 1837.

Suberect, slender, 8 to 12 mm. in diameter; ribs 4 or 5, thin, compressed; areoles 8 to 10 mm. apart; spines setiform, brown, short, 6 to 8 mm. long; flowers and fruit unknown.

Type locality: Brazil.

This species is not known to us from the incomplete description.

Pfeiffer refers here as a synonym *C. candelabrius* (Enum. Cact. 109. 1837).

23. **HELIOCEREUS** (Berger) Britton and Rose, Contr. U. S. Nat. Herb. **12**: 433. 1909.

Stems usually weak, procumbent or climbing over rocks and bushes, in cultivation often bushy and erect; branches strongly angled or ribbed; ribs or angles usually 3 or 4, sometimes up to 7; spines of all areoles similar; flowers diurnal, large, funnelform, only 1 at an areole, usually scarlet, sometimes white; tube short but definite; inner perianth-segments elongated; stamens numerous, declined; ovary spiny.

Type species: *Cactus speciosus* Cavanilles.

Heliocereus was considered a subsection of *Cereus* by Berger and, as stated by him, the species are closely related, the chief differences being in the flowers; they are all confined to Mexico and Central America. We recognize 5 species.

The plants are easily propagated by cuttings, but it has been our experience that they are among the most difficult cacti to grow under glass. It is said, however, if plants are grown out of doors during the summer, they make strong branches and flower abundantly during the winter. *H. speciosus* has been much used in hybridizing with various species of *Epiphyllum*, resulting in many types, some of which are greatly admired, and for which new specific, varietal, and form names have been proposed.

The name is from the Greek, meaning sun-cereus.

Key to Species.

Flowers red.
- Inner perianth-segments acuminate.
  - Style not longer than the stamens ..... 1. *H. elegantissimus*
  - Style definitely longer than the stamens ..... 2. *H. schrankii*
- Inner perianth-segments apiculate, rounded or abruptly tipped.
  - Perianth-segments apiculate or rounded ..... 3. *H. speciosus*
  - Perianth-segments abruptly tipped ..... 4. *H. cinnabarinus*

Flowers white ..... 5. *H. amecamensis*

1. Heliocereus elegantissimus nom. nov.

Cereus coccineus Salm-Dyck in Pfeiffer, Enum. Cact. 122. 1837. Not *C. coccineus* De Candolle, 1828.
Cereus speciosissimus coccineus Rümpler in Förster, Handb. Cact. ed. 2. 773. 1885.
Cereus speciosus coccineus Graebener, Monatsschr. Kakteenk. **19**: 137. 1909.
Heliocereus coccineus Britton and Rose, Contr. U. S. Nat. Herb. **12**: 433. 1909.

Stems at first erect, low, 1 to 2 dm. high; branches often decumbent, light green, 3 to 5 cm. broad, mostly 3 or 4-angled; ribs strongly undulate; areoles large, 1.5 to 2 cm. apart, yellow-felted; spines acicular, short, 1 cm. long or less, the radial ones bristly and white, the inner ones stiff and recurved; flowers scarlet, 10 to 15 cm. broad; perianth-segments lanceolate, acuminate, 7 cm. long or less; ovary 3 to 4 cm. long, oblong, with a few scattered spreading scales; style red, slender, not longer than the stamens; stigma-lobes white.

Type locality: Mexico.

Distribution: Mexico.

Illustrations: Blühende Kakteen **2**: pl. 118; Monatsschr. Kakteenk. **5**: 135; Pfeiffer and Otto, Abbild. Beschr. Cact. **1**: pl. 15, all three as *Cereus coccineus*.

Plate XVII, figure 1, shows a flowering branch of a plant in the collection of the New York Botanical Garden.

2. Heliocereus schrankii (Zuccarini) Britton and Rose, Contr. U. S. Nat. Herb. **12**: 434. 1909.

Cereus schrankii Zuccarini in Seitz, Allg. Gartenz. **2**: 244. 1834.

Stems ascending, branching; joints 1 to 2 cm. broad, 3 or 4-angled, somewhat winged, when young reddish, in age green; areoles 1.5 to 2 cm. apart, somewhat elevated; spines 6 to 8, acicular, white when young, yellowish brown in age; flowers dark red, large, 14 cm. broad; stamens numerous; style stout, red, longer than the stamens; stigma-lobes white; ovary oblong, 4 cm. long, spiny.

Type locality: Zimipan, Mexico.

Distribution: Known only from the type locality.

We know this plant only from descriptions and the cited illustration. It must be closely related to the preceding species and may not be specifically distinct from it.

Illustration: Pfeiffer and Otto, Abbild. Beschr. Cact. **1**: pl. 27, as *Cereus schrankii*.

3. **Heliocereus speciosus** (Cavanilles) Britton and Rose, Contr. U. S. Nat. Herb. **12**: 434. 1909.

Cactus speciosus Cavanilles, Anal. Cienc. Nat. Madrid **6**: 339. 1803.
Cactus speciosissimus Desfontaines, Mém. Mus. Hist. Nat. Paris **3**: 193. 1817.
Cereus bifrons Haworth, Suppl. Pl. Succ. 76. 1819.
Cereus speciosissimus De Candolle, Prodr. **3**: 468. 1828.
Cereus speciosus Schumann in Engler and Prantl, Pflanzenfam. $3^{6}{}_{a}$: 179. 1894. Not Sweet, 1826.

Stems clambering or hanging, strongly 3 to 5-ribbed, old parts bright green, young parts reddish; ribs strongly undulate; areoles distant, often 3 cm. apart, usually large, with felt and acicular spines; spines numerous, yellow or brownish in age, 1 to 1.5 cm. long; flowers scarlet, 15 to 17 cm. long, lasting for several days; perianth-segments oblong, 10 to 12 cm. long, with rounded, often apiculate tips; filaments weak, red; style little longer than the stamens; stigma-lobes white; ovary bearing scattered minute scales; fruit ovoid, 4 to 5 cm. long.

Type locality: Described from a garden plant.

Distribution: Central Mexico and reported from Central America.

Dr. Rose found this species very common on the pedregal near the City of Mexico. It there forms large masses, usually growing in the pot holes and at the mouths of dark caves, clambering over the rocks and occasionally giving off roots. Mr. Pringle found it at high elevations on the mountain ranges south of the City of Mexico.

Cereus speciosissimus grandiflorus (Pfeiffer, Enum. Cact. 122. 1837) is a hybrid with *Selenicereus grandiflorus*.

Cereus speciosissimus hansii Baumann (Förster, Handb. Cact. ed. 2. 773. 1885; *C. hansii* Haage in Förster, Handb. Cact. 428. 1846) is a hybrid with *Epiphyllum ackermannii*. *Cereus jenkinsoni* (Sweet, Hort. Brit. ed. 2. 237. 1830; *C. speciosissimus jenkinsonii* Pfeiffer, Enum. Cact. 121. 1837) is a hybrid obtained in 1824. *Cereus jenkinsonii verus* Haage (Förster, Handb. Cact. 429. 1846) is another hybrid. Here also belongs *Cereus speciosissimus lateritius* Pfeiffer (Enum. Cact. 121. 1837), which was earlier described and figured as *Cactus speciosissimus lateritius* (Edwards's Bot. Reg. **19**: pl. 1596. 1833) and, afterwards, as *Cereus lateritius* Salm-Dyck (Cact. Hort. Dyck. 1849. 53. 1850). The variety of *Cereus speciosissimus, albiflorus* (*Cereus albiflorus* Schumann, Gesamtb. Kakteen Nachtr. 54. 1903), though first mentioned in 1837, was without description, but was taken up and described along with *coccineus, hoveyi,* and *peacocki* by Rümpler (Förster, Handb. Cact. ed. 2. 772, 773) in 1885.

Cereus speciosissimus aurantiacus (Pfeiffer, Enum. Cact. 122. 1837; *C. aurantiacus* Förster, Handb. Cact. 428. 1846) is very briefly described.

The following are some of the hybrids of *Cereus speciosissimus* with *Epiphyllum phyllanthoides* which are listed by Walpers (Repert. Bot. **2**: 278. 1843): *bodii, bollwillerianus, bowtrianus, curtisii, eugenia, guillardieri, ignescens, kiardii, longipes, lothii, maelenii, mexicanus* Salm-Dyck, *roidii, sarniensis, superbus, unduliflorus, vandesii, vitellinus,* and *suwaroffii*. Some of these names had been previously used by Pfeiffer (Enum. Cact. 121. 1837) as varieties of this species, as follows: var. *curtisii, eugenia, guillardieri, ignescens, kiardii, lothii,* and *roydii*.

Among other named hybrids, Pfeiffer gave var. *devauxii* (*Cereus devauxii* Förster, Handb. Cact. 428. 1846). Förster (Handb. Cact. 428 to 431. 1846) also mentioned 66 hybrids with this species, among which are: *blindii* Haage, *colmariensis* Haage, *danielsii* Haage, *edesii* Booth, *elegans* Booth, *finkii* Salm-Dyck, *gebvillerianus* Haage, *gloriosus* Haage, *hitchensii* and its varieties *hybridus* and *speciosus, kampmannii* Haage, *kobii, latifrons, loudonii, macqueanus* Salm-Dyck, *maurantianus, merckii* Booth, *mittleri* Salm-Dyck, *muhlhausianus, peintneri* Haage, *rintzii* Salm-Dyck and the two varieties *roseus albus* and *roseus superbus, seidelii* Booth, *seitzii, selloii, smithii* (*Epiphyllum smithianum* Marnock, Floricult. Mag. **8**: pl. 13), *suwarowii,* and *triumphans*. In addition to these there are many hybrids with only an English name. There are also many quadrinomials.

M. E. Eaton del.

1. End of flowering branch of *Heliocereus elegantissimus*.
2. End of a flowering branch of *Heliocereus speciosus*.
3. A tip of a fruiting branch of *Harrisia portoricensis*.

(All natural size.)

Cereus setiger Haworth, Phil. Mag. 7: 110. 1830, although said to have come originally from Brazil, probably belongs here. *Cereus aurantiacum superbus* Haage (Labouret, Monogr. Cact. 428. 1853), a hybrid of this species, is only mentioned.

Cereus josselinacus D. Gaillard (Rev. Hort. 5: 56. 1841) is probably only a form.

Cereus serratus Weingart (Monatsschr. Kakteenk. 22: 185. 1912) is of this relationship. Rother believed it was of hybrid origin and Weingart at first agreed, but afterwards considered it distinct.

Cereus mexicanus Lemaire (Förster, Handb. Cact. 430. 1846) is a hybrid of which *Heliocereus speciosus* is one parent.

Illustrations: Blühende Kakteen 1: pl. 17; Schumann, Gesamtb. Kakteen f. 36, as *Cereus speciosus;* Herb. Génér. Amat. 5: pl. 351; Curtis's Bot. Mag. 49: pl. 2306; Loddiges, Bot. Cab. 10: pl. 924; Mém. Mus. Hist. Nat. Paris 3: pl. 9; Edward's Bot. Reg. 6: pl. 4; 28: pl. 49; Loudon, Encycl. Pl. 410. f. 6857, as *Cactus speciosissimus;* Schelle, Handb. Kakteenk. f. 35, as *Cereus speciosissimus.*

Plate XVII, figure 2, shows a flowering joint of a plant in the collection of the New York Botanical Garden.

4. Heliocereus cinnabarinus (Eichlam).

Cereus cinnabarinus Eichlam in Weingart, Monatsschr. Kakteenk. 20: 161. 1910.

Stems erect or in time creeping and more or less rooting, very slender, 1 to 1.5 cm. in diameter; ribs few, sometimes only 3 or 4; areoles 2 to 3 cm. apart; spines about 10, bristle-like, 6 to 8 mm. long; flowers about 15 cm. long, the tube bent just above the ovary, more or less funnelform; outer perianth-segments narrow, acute, green; inner perianth-segments oblong to spatulate, sometimes 2.5 cm. broad, abruptly acuminate, somewhat erose toward the apex; style rose-colored; stigma-lobes 7, white.

Type locality: Vulcan Agua, Guatemala.

Distribution: Guatemala.

We know the plant from specimens collected by E. W. Nelson on the volcano of Santa Maria, altitude 2,600 to 3,800 meters, January 24, 1896 (No. 3719).

It is like *Heliocereus elegantissimus,* but with slenderer stems, lower ribs, weaker spines, and abruptly acuminate inner perianth-segments.

This must be a very beautiful species and, growing at such high altitudes in Guatemala, suggests the possibility of its cultivation in the open in certain parts of the United States.

5. Heliocereus amecamensis* (Heese) Britton and Rose, Contr. U. S. Nat. Herb. 12: 433. 1909.

Cereus amecamensis Heese† in Rother, Prakt. Ratgeb. 11: 442. 1896.
Cereus amecaensis Heese, Gartenwelt 1: 317. 1897.

Plant pale green when young, similar to *H. speciosus* in habit and spines; ribs 3 to 5; flower 11 cm. long, 8 to 12.5 cm. in diameter; flower-tube 3.5 cm. long, 1 cm. in diameter, green, with green scales and whitish bristles; outer perianth-segments yellowish green, grading into oblanceolate white inner segments, 7 cm. long, 2 cm. wide; stamens white except the pale-green bases, attached all over the tube; anthers creamy white; style white, slightly exserted beyond the stamens, strongly curved down in the tube; stigma-lobes 11, linear, light creamy white; ovary cylindric, 6 mm. long.

Type locality: Amecameca, Mexico.

Distribution: Central Mexico.

This species has been introduced into Europe by Dr. C. A. Purpus, where it is now much cultivated.

Illustrations: Curtis's Bot. Mag. 135: pl. 8277; Rother, Prakt. Ratgeb. 11: 442; Garden 76: 306, all as *Cereus amecamensis;* Blühende Kakteen 3: pl. 157; Gard. Mag. 55: 427; Gartenwelt 1: 316, 317. f. 1 to 3, as *Cereus amecaensis.*

* Confusion of the type locality, Amecameca, with another Mexican town, Ameca, doubtless accounts for the two spellings of the name of this plant.

† Rother here spells this name *Hesse,* doubtless erroneously.

24. **TRICHOCEREUS** (Berger) Riccobono, Boll. R. Ort. Bot. Palermo **8**: 236. 1909.

Columnar plants, more or less branched; ribs few to numerous, either low or prominent, usually very spiny; flowers nocturnal, large, funnelform, the perianth either persistent or separating from the fruit by abscission; perianth-segments elongated; stamens numerous, filiform, arranged in two groups; stigma-lobes numerous; ovary and flower-tube bearing numerous scales, their axils bearing long hairs; fruit without bristles or spines, dull colored.

Type species: *Cereus macrogonus* Otto.

This genus consists of 19 species, confined to South America. It is based on the subgenus of the same name by Berger, but only 2 of Berger's species were transferred to it by Riccobono.

While the flowers of this genus suggest *Echinopsis*, we can not agree with Berger's suggestion that the genera might be united.

The name is from the Greek and signifies thread-cereus, referring to the hairy flower-areoles.

KEY TO SPECIES.

Stems more or less branched, usually erect.
- Limb of flower broad.
  - Joints relatively slender, 5 to 9 cm. thick.
    - Ribs transversely sulcate between the areoles.
      - Tubercles prominent ..... 1. *T. thelegonus*
      - Tubercles not prominent ..... 2. *T. thelegonoides*
    - Ribs not transversely sulcate between the areoles.
      - Central spine solitary ..... 3. *T. spachianus*
      - Central spines 4 ..... 4. *T. lamprochlorus*
  - Joints stout.
    - Ribs on old plants very numerous and the spines bristle-like ..... 5. *T. pasacana*
    - Ribs 4 to 17.
      - Spines slender, 1 to 7 cm. long.
        - Ribs 4 to 9.
          - Spines yellow, at least when young; ribs 4 to 8 ..... 6. *T. bridgesii*
          - Spines brown from the first; ribs 6 to 8.
            - Plant dark green; spines few at each areole or wanting ..... 7. *T. pachanoi*
            - Plant light green; spines several at each areole.
              - Spines acicular, 2.5 cm. long or less ..... 8. *T. macrogonus*
              - Spines subulate, up to 7 cm. long.
                - Spines swollen at base; young growth green ..... 9. *T. cuzcoensis*
                - Spines not swollen at base; young growth very glaucous ..... 10. *T. peruvianus*
        - Ribs 16 or 17 ..... 11. *T. chiloensis*
      - Spines very stout, formidable.
        - Spines dark brown ..... 12. *T. coquimbanus*
        - Spines yellow ..... 13. *T. terscheckii*
- Limb of flower narrow ..... 14. *T. fascicularis*

Stems usually simple, low, cespitose.
- Flowers red or yellow, short, more or less campanulate ..... 15. *T. huascha*
- Flowers elongated, funnelform, white.
  - Tube longer than the limb.
    - Ribs few, 9 to 11 ..... 16. *T. candicans*
    - Ribs 12 to 18.
      - Stem slender, elongated ..... 17. *T. strigosus*
      - Stem stout, short ..... 18. *T. shaferi*
  - Tube about the length of the limb ..... 19. *T. schickendantzii*

1. Trichocereus thelegonus (Weber).

Cereus thelegonus Weber in Schumann, Gesamtb. Kakteen 78. 1897.

Stems procumbent or sometimes with erect branches, elongated, 4 to 10 dm. long, dark green, cylindric, 4 to 7.5 cm. in diameter; ribs 12 or 13, broad and obtuse, divided into prominent, more or less distinctly 6-sided tubercles; areoles circular, felted; spines at first brown, some turning gray, others black; radial spines 6 to 8, acicular, somewhat spreading, 1 to 2 cm. long; central spine solitary, porrect, 2 to 4 cm. long; flowers white, about 20 cm. long, funnelform; outer perianth-segments greenish; axils of scales on flower-tube long-woolly; fruit about 5 cm. long, hairy, red, splitting on one side; seed black.

Type locality: Tucuman, Argentina.
Distribution: Northwestern Argentina.

This species has heretofore been unknown to us, but fine specimens, both living and for the herbarium, were obtained by J. A. Shafer at Tapia, Tucuman, near the type locality, February 9, 1917 (No. 98).

Illustration: Schumann, Gesamtb. Kakteen f. 14, as *Cereus thelegonus*.

Figure 188 is from a photograph of a flowering branch in the garden of Dr. Spegazzini at La Plata, Argentina; figure 189 is from a photograph of the wild plant taken by Dr. Shafer in 1917 at Tapia, Argentina.

FIG. 188.—Trichocereus thelegonus.

2. **Trichocereus thelegonoides** (Spegazzini).

Cereus thelegonoides Spegazzini, Anal. Mus. Nac. Buenos Aires III. 4: 480. 1905.

More or less branched above; trunk 4 to 6 meters high, cylindric, 18 cm. in diameter; branches more or less curved, ascending, 5 to 8 cm. in diameter, obtuse at apex; ribs 15, low, obtuse, at first strongly tubercled by a strong depression between the areoles, but gradually disappearing in age; areoles small, circular, felted; spines 8 to 10, yellow or brownish, setaceous, short, 4 to 8 mm. long; flowers 20 to 24 cm. long, greenish without; inner perianth-segments oblanceolate, acute, white; scales on the ovary and flower-tube hairy in their axils.

Type locality: Jujuy, Argentina.

Distribution: Northern Argentina.

Living specimens were brought from Argentina by Dr. Rose in 1915.

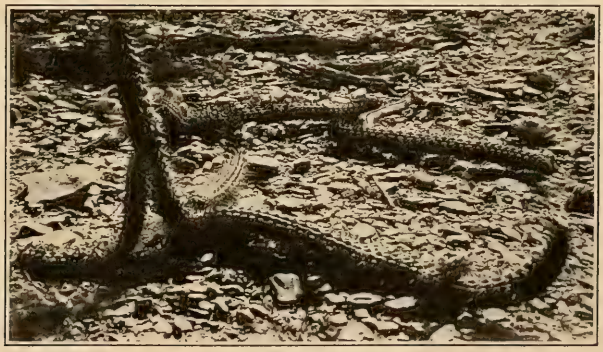


FIG. 189.—Trichocereus thelegonus.

3. **Trichocereus spachianus** (Lemaire) Riccobono, Boll. R. Ort. Bot. Palermo 8: 237. 1909.

Cereus spachianus Lemaire, Hort. Univ. 1: 225. 1840.
Echinocereus spachianus Rümpler in Förster, Handb. Cact. ed. 2. 827. 1885.
Cereus santiaguensis Spegazzini, Anal. Mus. Nac. Buenos Aires III. 4: 478. 1905.

Stem upright, at first simple, later profusely branching at the base; branches ascending parallel with the main stem, 6 to 9 dm. high by 5 to 6 cm. in diameter, columnar; ribs 10 to 15, obtuse,

rounded; areoles about 1 cm. apart, large, covered with curly yellow wool, becoming white; radial spines 8 to 10, 6 mm. to 1 cm. long, spreading, stiff, sharp, amber-yellow to brown; central solitary, stronger and longer than the radials; all the spines later becoming gray; flowers about 20 cm. long by about 15 cm. in diameter, white.

Type locality: Argentina, but definite locality not cited.
Distribution: Western Argentina.
This species was named for Edward Spach (1801–1879).

Illustrations: Monatsschr. Kakteenk. **10:** 93; Rep. Mo. Bot. Gard. **16:** pl. 8, f. 2, 3; Sunset Mag. July 1915, p. 166; Schelle, Handb. Kakteenk. f. 18, as *Cereus spachianus.*

Figure 190 is from a photograph of a plant in the collection of the New York Botanical Garden.

FIG. 190.—Trichocereus spachianus.

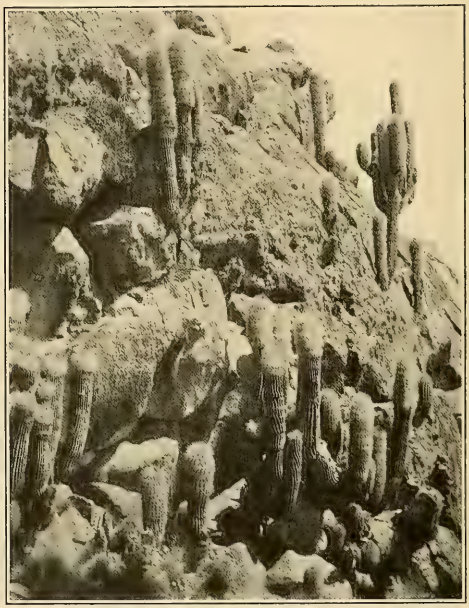


FIG. 191.—Trichocereus pasacana.

4. **Trichocereus lamprochlorus** (Lemaire).

Cereus lamprochlorus Lemaire, Cact. Aliq. Nov. 30. 1838.
Cereus nitens Salm-Dyck, Allg. Gartenz. **13:** 354. 1845.
Echinocereus lamprochlorus Rümpler in Förster, Handb. Cact. ed. 2. 831. 1885.
Echinopsis lamprochlora Weber, Dict. Hort. Bois 471. 1896, as synonym.

Columnar, simple or branching at base, 1.5 to 2 meters high, 7 to 8 cm. in diameter; ribs 10 to 17, low and rounded; radial spines 11 to 14, acicular to subulate, 8 to 10 mm. long; central spines 4, 2 cm. long; flowers funnelform, 20 to 24 cm. long; outer perianth-segments red; inner perianth-segments white, 2.5 cm. long, acuminate.

Type locality: Not cited.
Distribution: Northern Argentina and, according to Rümpler, Bolivia.

Cereus lamprochlorus salinicolus Spegazzini (Anal. Mus. Nac. Buenos Aires II. 4: 286. 1902) from southern Argentina, may belong here, but it is much south of the range of this species; *Cereus chiloensis lamprochlorus* Monville (Labouret, Monogr. Cact. 326. 1853) is given as a synonym. *Echinocactus wangertii* (Labouret, Monogr. Cact. 326. 1853) has been referred here as a synonym.

The type specimens were without flowers and fruit. Afterward, Schumann referred to this species a plant collected by Otto Kuntze in Jujuy, Argentina, in October 1892. A specimen of this collection is now in the herbarium of the New York Botanical Garden, and has been used in drawing up the above description, together with plants and specimens obtained by Dr. Shafer at Andalgala, Argentina, in 1917 (No. 13). A cespitose plant with long procumbent stems is sometimes associated with this species, but whether conspecific with it or distinct we have been unable to ascertain.

Illustration: Monatsschr. Kakteenk. 26: 60, as *Cereus lamprochlorus*.

Figure 192 is from a photograph of plants in flower, taken by Dr. Shafer in 1917.

FIG. 192 —Trichocereus lamprochlorus.

5. Trichocereus pasacana (Weber).

Pilocereus pasacana Rümpler in Förster, Handb. Cact. ed. 2. 678. 1885.
Cereus pasacana Weber, Monatsschr. Kakteenk. 3: 165. 1893.

Plant often 6 to 10 meters high, sometimes less than 1 meter, usually either simple or with few branches and resembling a small *Carnegiea gigantea*, sometimes with a number of branches from the base, more or less club-shaped, 3 dm. in diameter near the top, when old spineless at base; ribs 20 to 38, low, 2 cm. high; areoles large, approximate, sometimes touching one another; spines numerous, rather variable on young plants; spines yellow, stiff, subulate, the longer ones 4 to 14 cm. long; on old plants, especially flowering ones, elongated, flexible, sometimes bristle-like, 10 to 12 cm. long, yellow or even white; flowers 10 cm. long, the ovary and tube covered with long brown hairs; fruit globular, about 3 cm. in diameter; seeds small, dull black.

Type locality: High valleys of cordilleras of Catamarca and Salta, Argentina.

Distribution: Argentina and Bolivia.

This species is very characteristic of the high plains of northern Argentina and Bolivia, sometimes growing in valleys, but usually along cliffs and on rocky hillsides, and often forms the most conspicuous plant in the landscape. The woody trunks are used for making goat corrals and rude huts. The fruit, which is said to be edible, is called pasacana.

Illustrations: Nov. Act. Soc. Sci. Upsal. IV. 1: pl. 4; pl. 5, f. 1, as *Cereus pasacana*.

Figure 191 is from a photograph taken by Dr. Rose near Comanche, Bolivia, in 1914; figure 193 shows a flower and figure 194 a fruit collected by Dr. Shafer near Andalgala, Argentina, in 1916.

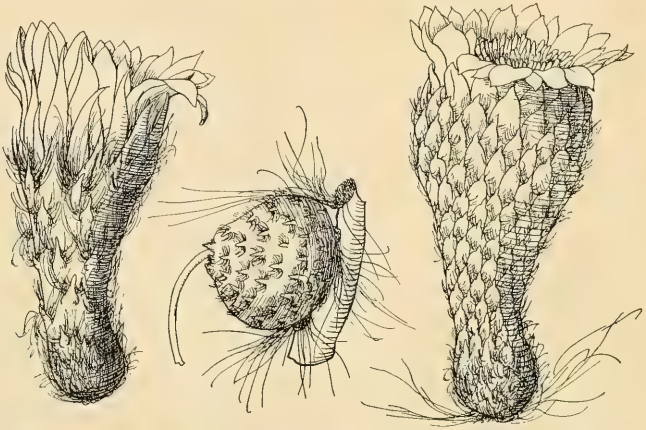


FIG. 193.—Flower of T. pasacana. ×0.6.

FIG. 194.—Fruit of T. pasacana. ×0.6.

FIG. 195.—Flower of T. candicans. ×0.6.

6. Trichocereus bridgesii (Salm-Dyck).

Cereus bridgesii Salm-Dyck, Cact. Hort. Dyck. 1849. 208. 1850.
Cereus lagenaeformis Förster, Hamb. Gartenz. **17**: 164. 1861.
Cereus bridgesii brevispinus Schumann, Gesamtb. Kakteen 108. 1897.
Cereus bridgesii lageniformis Schumann, Gesamtb. Kakteen 108. 1897.
Cereus bridgesii longispinus Maass, Monatsschr. Kakteenk. **15**: 119. 1905.
Cereus lasianthus Schumann in Rusby, Bull. N. Y. Bot. Gard. **4**: 365. 1907, as hyponym.

Tall, 2 to 5 meters high, more or less branching, pale green, a little glaucous; branches 1 to 1.5 dm. in diameter, 4 to 8-ribbed; ribs obtuse, separated by broad but shallow intervals; areoles large, about 2 cm. apart; spines 2 to 6, yellowish, acicular to subulate, very unequal, sometimes 10 cm. long, not swollen at base; flowers large, 18 cm. long; flower-tube 5 to 6 cm. long; throat broad; inner perianth-segments oblong, perhaps white, 5 to 6 cm. long; scales on ovary and flower-tube small, sometimes only 3 to 4 mm. long, scattered, bearing numerous hairs in their axils; fruit scaly, long-hairy, 5 to 6 cm. long.

Type locality: Not cited.

Distribution: About La Paz, Bolivia, where it is frequently grown as a hedge plant or placed on the tops of walls for the protection of gardens.

Mr. Juan Söhrens reports a similar plant from northern Chile which may belong here, or it may be the little-known *Cereus arequipensis*.

The origin of this species is unknown, but since it was named for Bridges, who collected in Bolivia, it is probable that it came from that country. Dr. Rose's specimens from Bolivia (No. 18842) closely resemble living plants so named from European collections, now represented in the New York Botanical Garden, so that we have no hesitancy in referring them here.

7. Trichocereus pachanoi sp. nov.

Plants tall, 3 to 6 meters high, with numerous strict branches, slightly glaucous when young, dark green in age; ribs 6 to 8, broad at base, obtuse, with a deep horizontal depression above the areole; spines often wanting, when present few, 3 to 7, unequal, the longest 1 to 2 cm. long, dark

yellow to brown; flower-buds pointed; flowers very large, 19 to 23 cm. long, borne near the top of branches, night-blooming, very fragrant; outer perianth-segments brownish red; inner perianth-segments oblong, white; filaments long, weak, greenish; style greenish below, white above; stigma-lobes linear, yellowish; ovary covered with black curled hairs; axils of scales on flower-tube and fruit bearing long black hairs.

Collected by J. N. Rose, A. Pachano, and George Rose at Cuenca, Ecuador, September 17 to 24, 1918 (No. 22806, type).

This species is widely cultivated throughout the Andean region of Ecuador, where it is grown both as an ornamental and as a hedge plant. In some of the lateral valleys on the western slope of the Andes it appears to be native, as for instance above Alausí, but as it has doubtless long been cultivated it is impossible to be sure of its natural habitat.

It is known to the Ecuadoreans as agua-colla or giganton and has been passing in Ecuador under the names of *Cereus peruvianus* and *Cereus giganteus*. It is named for Professor Abelardo Pachano of the Quinta Normal at Ambato, Ecuador, who accompanied Dr. Rose in 1918 on his travels in the high Andes of Ecuador.

FIG. 196.—Trichocereus pachanoi.

This species belongs to the high Andes, ranging from 2,000 to 3,000 meters in altitude. In the Chanchan Valley it certainly comes down to about 2,000 meters and overlaps the upper range of *Lemaireocereus godingianus*, which differs from it greatly in habit and flowers. Different as the two plants are, Richard Spruce, keen botanist as he was, confused them, as the following quotation will show; the part in italics refers to the *Lemaireocereus:*

"The brown hill-sides began to be diversified by an arborescent Cactus, with polygonal stems and white dahlia-like flowers, *which, Briareus-like, threw wide into the air its hundred rude arms. Lower down, at about 6,000 feet, I saw specimens full 30 feet high and 18 inches in diameter.*"

Figure 196 shows the top of a large plant growing on the sides of a cliff on the outskirts of Cuenca, Ecuador, photographed by George Rose in September 1918.

8. **Trichocereus macrogonus** (Salm-Dyck) Riccobono, Boll. R. Ort. Bot. Palmero 8: 236. 1909.

Cereus macrogonus Salm-Dyck, Cact. Hort. Dyck. 1849. 203. 1850.
Eriocereus tephracanthus Riccobono, Boll. R. Ort. Bot. Palermo 8: 244. 1909.

Stem probably tall, stout, but in cultivation often slender, bluish green, especially on young growth; ribs usually 7, low and rounded, 1.5 cm. high, separated by acute intervals; areoles large, 1.5 to 2 cm. apart; spines several from an areole, acicular, brown; radial spines 5 to 8 mm. long; central spine about 2 cm. long; flowers probably large and white; fruit unknown.

Type locality: Not cited.

Distribution: South America, but not known definitely in the wild state.

This species is represented in the New York Botanical Garden by a live specimen from Kew, which we consider typical. Salm-Dyck described it from specimens growing in the Botanical Garden at Berlin, but did not know their origin. Schumann figured what he supposed to be it in the Flora Brasiliensis, referring it to Brazil; his plant is from the Province of Rio de Janeiro, collected by Glaziou, and is undoubtedly *Cephalocereus arrabidae.*

Cereus tetracanthus Labouret (Rev. Hort. IV. 4: 25. 1855) and *C. tephracanthus bolivianus* Weber (Schumann, Gesamtb. Kakteen 81. 1897) are probably of this relationship; both forms come from Bolivia. Rümpler (Förster, Handb. Cact. ed. 2. 712. 1885) says the former came from Chuquisaca, Bolivia. An earlier reference (Steudel, Nom. ed. 2. 1: 336. 1840), but of slightly different spelling, cites Link and Otto as authors of this name, but the species was not described. To one of these forms may belong the plant in the New York Botanical Garden (No. 6231), obtained from M. Simon, St. Ouen, Paris, in 1901, which is called *Cereus bolivianus.* The last name, first credited to Weber (Monatsschr. Kakteenk. 12: 21. 1902), is occasionally met in literature.

Cereus hempelianus Bauer (Monatsschr. Kakteenk. 17: 55. 1907) is, according to F. Fobe, only a stout, bluish-green variety of *C. macrogonus.*

9. **Trichocereus cuzcoensis** sp. nov.

Plants tall, 5 to 6 meters high, much branched, the branches somewhat spreading, light green when young; ribs 7 or 8, low and rounded; areoles rather close together, 1 to 1.5 cm. apart; spines numerous, often 12, very stout, rigid, sometimes 7 cm. long, swollen at base; flowers 12 to 14 cm. long, doubtless nocturnal but, sometimes at least, remaining open during the morning, fragrant; flower-tube green, 5 to 6 cm. long; inner perianth-segments oblong, white, 4 to 5 cm. long; filaments weak, declining on the lower side of the throat; scales on the ovary and flower-tube small, bearing a few long hairs in their axils; fruit not known.

Collected by J. N. Rose below Cuzco, Peru, September 1, 1914 (No. 19022).

10. **Trichocereus peruvianus** sp. nov.

Plant 2 to 4 meters high with numerous erect or ascending, stout branches, 15 to 20 cm. in diameter, glaucous when young; ribs 6 to 8, broad and rounded; areoles large, 2 to 2.5 cm. apart, brown-felted; spines brown from the first, about 10, unequal, some of them 4 cm. long, rigid and stout, not at all swollen at base; areoles on ovary and flower-tube hairy; mature flowers not seen but evidently large and probably white.

Collected by Dr. and Mrs. Rose near Matucana, Peru, altitude 2,100 meters, July 9, 1914 (No. 18658).

FIG. 197.—Trichocereus peruvianus.

This species resembles *T. bridgesii* but has stouter and darker spines. It is found on the western slopes of the Andes at a much lower altitude than that species.

Figure 197 is from a photograph taken by Mrs. J. N. Rose at Matucana, Peru, in 1914.

11. Trichocereus chiloensis (Colla).

Cactus chiloensis Colla, Mem. Accad. Sci. Torino **31**: 342. 1826.
Cereus chiloensis De Candolle, Prodr. **3**: 465. 1828.
Cereus chilensis Pfeiffer, Enum. Cact. 86. 1837.
Cereus panoplaeatus Monville, Hort. Univ. **1**: 220. 1840.
Cereus heteromorphus Monville, Hort. Univ. **1**: 221. 1840.
Cereus longispinus Salm-Dyck, Allg. Gartenz. **13**: 354. 1845.
Cereus pepinianus Lemaire in Salm-Dyck, Allg. Gartenz. **13**: 354. 1845.*
Cereus subuliferus Salm-Dyck, Allg. Gartenz. **13**: 354. 1845.
Cereus gilvus Salm-Dyck, Allg. Gartenz. **13**: 355. 1845.
Cereus quisco Remy in Gay, Fl. Chilena **3**: 19. 1847.
Cereus linnaei Förster, Hamb. Gartenz. **17**: 165. 1861.
Cereus funkii Schumann, Gesamtb. Kakteen 61. 1897.
Cereus chilensis pycnacanthus Schumann, Gesamtb. Kakteen 63. 1897.
Cereus chilensis zizkaanus Schumann, Gesamtb. Kakteen 63. 1897.
Cereus chilensis panhoplites Schumann, Gesamtb. Kakteen 63. 1897.
Cereus chilensis poselgeri Schumann, Gesamtb. Kakteen 63. 1897.
Cereus chilensis heteromorphus Schumann, Gesamtb. Kakteen 63. 1897.
Cereus chilensis polygonus Schumann, Gesamtb. Kakteen 63, 1897.

FIG. 198.—Trichocereus chiloensis.

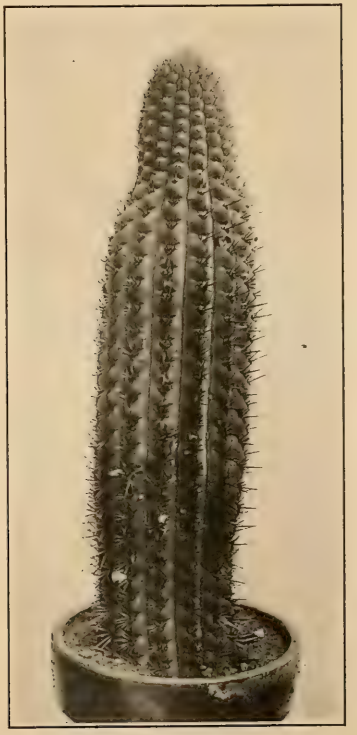


FIG. 199.—Trichocereus chiloensis.

* *Cereus pepinianus* was described by Salm-Dyck in 1845 (Allg. Gartenz. **13**: 354. 1845) who there credits the name to Lemaire. Lemaire evidently had reported the name under some other genus, for in 1850 (Salm-Dyck, Cact. Hort. Dyck. 1849. 44, 197) Salm-Dyck redescribed the species, crediting himself with the name and citing "*Echinocactus pepinianus* Cat. Cels" as synonym. The name *Echinocactus pepinianus* Lemaire occurs first in 1846 (Förster, Handb. Cact. 347), but without description. Labouret in 1853 takes it up as *Echinocactus echinoides pepinianus* (Monogr. Cact. 178), with the statement that Salm-Dyck considered it synonymous with *Cereus pycnacanthus*. These two combinations in *Echinocactus*, while evidently referring to *Cereus pepinianus*, being without description, can not be properly referred here as synonyms. They are, however, both referred by Schumann to *Echinocactus pepinianus*. The plant which he describes, however, is different from *Cereus pepinianus*. If a good *Echinocactus*, it should be credited to Schumann, with the citation to his monograph (Gesamtb. Kakteen 420. 1898).

Stems rarely single, usually of several branches, sometimes of many, arising from near the base, starting nearly at right angles to the main trunk but soon erect, the tallest sometimes 8 meters high; ribs usually 16 or 17, low and broad, separated by narrow intervals, divided into large tubercles even when fully mature; radial spines when young light yellow with brown tips but soon becoming gray, 8 to 12, slightly spreading, often stout, 1 to 2 or even 4 cm. long; central spine single, porrect, often stout, 4 to 7 or even 12 cm. long; flowers 14 cm. long, outer perianth-segments white but tinged with red or brown; inner perianth-segments white, acuminate; style green below, cream-colored above; stigma-lobes cream-colored, about 18, 1.5 cm. long; fruit globular.

Type locality: Described from cultivated plants supposed to have come from Chile.

Distribution: On the hills in and about the great central valley of Chile, extending from Curico north to Puenta Colorado in the northern part of the province of Coquimbo.

While this plant shows considerable variation in its spines, we do not believe it possible to separate the species into varieties as Schumann has done.

Echinocactus jeneschianus Pfeiffer (Allg. Gartenz. **8**: 406. 1840) and *Echinocactus pepinianus echinoides* (Labouret, Monogr. Cact. 177. 1853) are referred to *Echinocactus echinoides* by Labouret.

Echinocereus chiloensis Console and Lemaire (Rev. Hort. **35**: 173. 1864) is only mentioned, but Lemaire later (Cact. 61. 1868) states that it is based on *Cereus chiloensis*, which definitely places it here.

Cereus chilensis funkianus (Schumann, Gesamtb. Kakteen 61. 1897) has never been formally published.

Cereus polymorphus (published as a synonym of *Opuntia polymorpha* in Förster, Handb. Cact. 472. 1846), referred here by Schumann, should doubtless go elsewhere, for it is said to come from Mendoza, Argentina. It may be a form of *Opuntia glomerata*.

FIG. 200.—Flower of T. chiloensis. ×0.5.

FIG. 201.—Trichocereus coquimbanus.

Cereus pycnacanthus Salm-Dyck (Allg. Gartenz. **13**: 355. 1845), and *Cereus panoplaeatus* Cels (Salm-Dyck, Cact. Hort. Dyck. **1849**. 44. 1850) published as a synonym of the former, were both referred to *Cereus chilensis* by Schumann, but they came from Bolivia and the description does not fit this species.

Cereus fulvibarbis Otto and Dietrich (Allg. Gartenz. 6: 28. 1838; *Cereus chilensis fulvibarbis* Salm-Dyck in Walpers, Repert. Bot. 2: 276. 1843), said to have come from Chile, is referred to *Cereus chilensis* by Schumann, but it is described as having 10 to 13 ribs.

Cereus polymorphus G. Don (Loudon, Hort. Brit. 195. 1830) and *Cactus polymorphus* Gillies (published here as a synonym), referred to *Cereus chilensis* by Schumann, can not be identified from the meager description. It is said to have been introduced from Chile in 1827.

The following names belong here; they have not been accompanied by descriptions.

Cereus quintero Pfeiffer, Enum. Cact. 86. 1837.
chilensis brevispinulus Salm-Dyck in Walpers, Repert. Bot. 2: 276. 1843.
spinosior Salm-Dyck in Förster, Handb. Cact. 377. 1846.
flavescens Salm-Dyck, Cact. Hort. Dyck. 1849. 44. 1850.
eburneus (Schumann, Gesamtb. Kakteen 63. 1897) based on *Eulychnia eburnea* Philippi, must belong here.
linnaei Schumann, Gesamtb. Kakteen 63. 1897.
quisco Weber in Hirscht, Monatsschr. Kakteenk. 8: 110. 1898.

Cereus spinibarbis var. *minor* Monville and var. *purpureus* Monville (Labouret, Monogr. Cact. 334. 1853) have been referred here.

Cereus elegans Lemaire and *C. duledevantii* Lemaire (Illustr. Hort. 5: Misc. 10. 1858), unpublished, doubtless were given to forms of this species. *Echinocactus pyramidalis* and *E. elegans* (Pfeiffer, Enum. Cact. 86. 1837) were given only as synonyms of *Cereus chilensis*.

Illustration: Engler and Drude, Veg. Erde 8: pl. 19, as *Cereus chilensis*.

Figure 198 is from a photograph of a group of plants taken in Valparaiso, Chile, by Dr. Rose in 1914; figure 199 is from a photograph of a branch from the same group as grown in the New York Botanical Garden; figure 200 is from a drawing of a flower brought back by Dr. Rose from La Serena, Chile, in 1914.

12. **Trichocereus coquimbanus** (Molina).

Cactus coquimbanus Molina, Sagg. Stor. Nat. Chil. 170. 1782.
Cereus nigripilis Philippi, Fl. Atac. 23. 1860.
Cereus coquimbanus Schumann, Gesamtb. Kakteen 58. 1897.

Plant low, 1 meter high or more, or sometimes prostrate and forming dense thickets; branches 7 to 8 cm. in diameter, with 12 or 13 ribs; areoles large, circular, filled with short wool; spines about 20, very for: idable, often 7 to 8 cm. long; central spines several, 2 to 6 cm. long; flowers large, white, about 10 cm. long; inner perianth-segments acute; scales of ovary and tube subtending black hairs.

FIG. 202.—Trichocereus coquimbanus.

Type locality: Coquimbo to Paposo, Chile.

Distribution: Along the coast of the province of Coquimbo, Chile.

Cereus chilensis nigripilis (Hirscht, Monatsschr. Kakteenk. **8**: 159. 1898) doubtless belongs here.

Illustrations: Monatsschr. Kakteenk. **11**: 27; Schumann, Gesamtb. Kakteen Nachtr. f. 3, both as *Cereus nigripilis*.

Figure 201 is from a photograph of a plant brought by Dr. Rose from the Botanical Garden at Santiago, Chile, in 1914; figure 202 is from a photograph taken by Dr. Rose at Coquimbo, Chile, in 1914.

13. Trichocereus terscheckii (Parmentier).

Cereus terscheckii Parmentier in Pfeiffer, Allg. Gartenz. **5**: 370. 1837.
Cereus ferchekii Parmentier, Hort. Belge **5**: 66. 1838 (*fide* Index Kewensis).
Cereus fulvispinus Salm-Dyck, Cact. Hort. Dyck. 1849. 46. 1850.
Pilocereus terscheckii Rümpler in Förster, Handb. Cact. ed. 2. 688. 1885.

At first columnar, in age becoming much branched, 10 to 12 meters high; trunk woody, up to 4.5 cm. in diameter; branches 1 to 2 dm. in diameter; ribs 8 to 14, prominent, 2 to 4 cm. high, obtuse; areoles large, 1 to 1.5 cm. in diameter, felted, 2 to 3 cm. apart; spines 8 to 15, subulate, yellow, up to 8 cm. long; flowers very large, 15 to 20 cm. long, 12.5 cm. broad; inner perianth-segments oblong, 7 cm. long, acute, white; scales on the ovary and flower-tube ovate, mucronate-tipped, their axils filled with long brown wool.

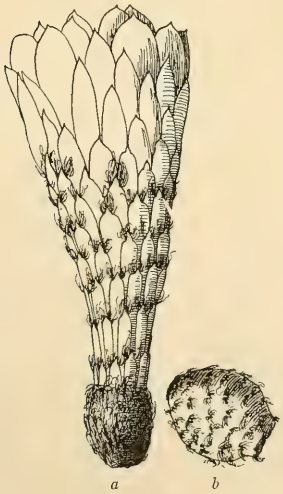


FIG. 203.—Trichocereus terscheckii. *a*, flower; *b*, fruit. ×0.4.

FIG. 204.—Trichocereus terscheckii.

Type locality: Argentina, but no definite locality cited.

Distribution: Northern Argentina.

This is a very large cactus, called in Argentina cardon grande. It has frequently been confused with another species, *T. pasacana*, of the same region, but it is more branched, with fewer ribs, different spines, and larger flowers.

Figure 203*a* shows a flower and figure 203*b* a fruit, collected by Dr. Shafer near Salta, Argentina, in 1916; figure 204 is from a photograph taken by Dr. Shafer at Salta, Argentina, in 1917.

14. Trichocereus fascicularis (Meyen).

Cereus fascicularis Meyen, Allg. Gartenz. 1: 211. 1833.
Cactus fascicularis Meyen, Reise 1: 447. 1834.
Echinocactus fascicularis Steudel, Nom. ed. 2. 1: 536. 1840.
Cereus weberbaueri Schumann in Vaupel, Bot. Jahrb. Engler 50: Beibl. 111: 22. 1913.

FIG. 205.—Trichocereus fascicularis.

Growing in large clusters made up of many slender, erect or ascending branches, 2 to 4 meters high; ribs about 16, low, rounded, separated by narrow intervals; areoles filled with tawny felt, closely set, large; spines numerous, at first yellowish to brown; radial spines acicular, often only 1 cm. long or less; central spines much stouter and often 4 cm. long; flowers 1 from an areole, 8 to 11 cm. long, slender, somewhat curved near the base; ovary and flower-tube bearing small ovate scales, their axils filled with long white and brown hairs; outer perianth-segments narrow, acute, passing into broader ones, simply mucronate, pinkish; inner perianth-segments thinner and a little broader than the outer ones, obtuse, 1.5 cm. long, greenish to brownish (not white); filaments numerous, slender, scattered over the narrow throat, somewhat exserted; style bulbose at base, slender, 7 cm. long, exserted; stigma-lobes short, greenish; lower part of tube or tube proper 1.5 cm. long, somewhat scabrous within; fruit globular, 3 to 4 cm. in diameter, yellowish to reddish, splitting open on one side and exposing the pulp; seeds black, shining, 2 mm. long, a little longer than broad, minutely punctate.

Type locality: Southern Peru.

Distribution: Mountains of southern Peru and northern Chile, at about 2,300 meters altitude. At Arequipa it is especially common, being found both above and below the city, where it was collected by Dr. Rose in 1914 (No. 18781).

This species, although recently described as new under the name of *Cereus weberbaueri*, is the one described by Meyen in 1833 as *Cereus fascicularis*. Meyen's description is very unsatisfactory, but he does describe the habit, number of ribs, and size of flowers, all of which answer fairly well to our plant. A translation of his brief description is as follows: Erect, 16-angled, 4 feet high, somewhat jointed (3 to 4 joints); spines 8 or 9, in a radiating circle; flowers 9 or 10, white, 3.5 inches long, at the ends of the branches.

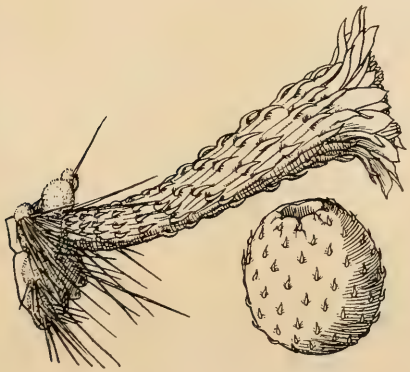


FIG. 206.—Flower of Trichocereus fascicularis. ×0.7.
FIG. 207.—Fruit of same. ×0.7.

FIG. 208.—Flower of Trichocereus huascha. ×0.7.
FIG. 209.—Fruit of same. ×0.7.

The flowers of this species differ from those of typical *Trichocereus* in that they are very slender, bent near the base, and have short perianth-segments.

Figure 205 is from a photograph taken by Dr. Rose at Arequipa, Peru, in 1914; figure 206 shows the flower and figure 207 the fruit of the plant photographed.

15. Trichocereus huascha (Weber).

Cereus huascha Weber, Monatsschr. Kakteenk. 3: 151. 1893.
Cereus huascha flaviflorus Weber, Monatsschr. Kakteenk. 3: 151. 1893.

More or less cespitose, forming clumps 8 to 20 dm. broad; stems 8 to 16 dm. high, cylindric, 4 to 5 cm. in diameter; ribs 12 to 18, low, rounded; areoles approximate, often only 5 to 7 mm. apart; spines numerous, acicular, unequal, the longest often 5 to 6 cm. long, yellowish to brown; flowers very variable in color and size, red to yellow, 7 to 10 cm. long, broadly funnelform; scales on the ovary bearing long brown hairs.

Type locality: Yacutala, Catamarca, Argentina.

Distribution: Northern Argentina.

Cereus huascha flaviformis Weber (Monatsschr. Kakteenk. 3: 136. 1893) is only a name.

Figure 208 shows a flower and figure 209 a fruit collected by Dr. Shafer near Andalgala, Argentina, in 1916; figure 210 is from a photograph of the plant from which the flowers and fruit were taken.

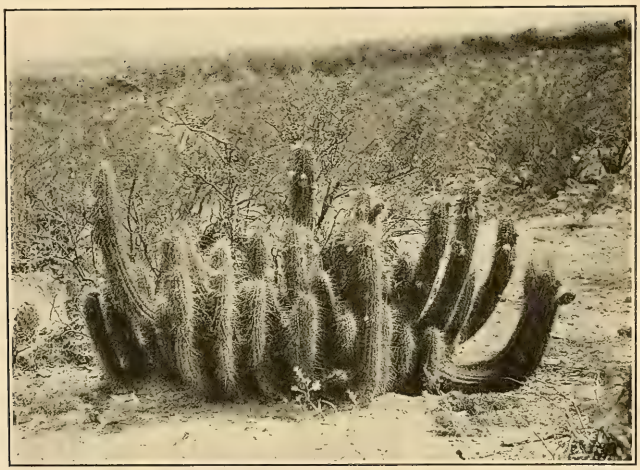


FIG. 210.—Trichocereus huascha.

16. Trichocereus candicans (Gillies).

Cereus candicans Gillies in Salm-Dyck, Hort. Dyck. 335. 1834.
Cereus candicans tenuispinus Pfeiffer, Enum. Cact. 91. 1837.
Cereus gladiatus Lemaire, Cact. Aliq. Nov. 28. 1838.
Cereus candicans robustior Salm-Dyck, Cact. Hort. Dyck. 1849. 43. 1850.
Echinocereus candicans Rümpler in Förster, Handb. Cact. ed. 2. 832. 1885.
Echinocereus gladiatus Rümpler in Förster, Handb. Cact. ed. 2. 833. 1885.
Echinopsis candicans Weber, Dict. Hort. Bois 471. 1896, as synonym.
Cereus candicans courantii Schumann, Gesamtb. Kakteen 70. 1897.
Cereus candicans gladiatus Schumann, Gesamtb. Kakteen 70. 1897.

Cespitose, forming large clumps often 1 to 3 meters in diameter; joints erect or spreading, 6 dm. long or less, 14 cm. in diameter or less, rounded at apex; ribs 9 to 11, low, rounded or obtuse; areoles large, white-felted when young, 2 to 3 cm. apart; spines subulate, brownish yellow, more or less mottled; radial spines 10 or more, more or less spreading, unequal, the longest 4 cm. long;

central spines several, the longest nearly 10 cm. long; flowers very large, funnelform, very fragrant, showy, 15 cm. long; scales on flower-tube ovate, acuminate, bearing long hairs in their axils; inner perianth-segments white, oblong; fruit globose to ellipsoid, splitting on one side.

Type locality: Not cited, but doubtless Mendoza, Argentina.

Distribution: Mendoza and northward, Argentina,

Schumann describes 3 varieties, all apparently from Mendoza, which we have merged into the species. Plants as seen in the field show even greater variation than is called for in Schumann's descriptions, but they all evidently grade into one another.

Cereus montezumae Hortus (Pfeiffer, Enum. Cact. 91. 1837, as synonym), *C. dumesnilianus* Haage (Schumann, Monatsschr. Kakteenk. 4: 172. 1894, as a probable variety of *C. candicans*), *C. dumesnilianus* Monville (Weber, Dict. Hort. Bois 279. 1894, as synonym), *Echinopsis dumesniliana* Cels (Schumann, Gesamtb. Kakteen 69. 1897, as synonym; *C. candicans dumesnilianus* Zeissold, Monatsschr. Kakteenk. 3: 140. 1893), and *Echinocereus candicans tenuispinus* Pfeiffer (Förster, Handb. Cact. ed. 2. 833. 1885) are usually referred here. *Echinocactus candicans* (Pfeiffer, Enum. 91. 1837) is a synonym only.

Cereus candicans spinosior Salm-Dyck (Walpers, Repert. Bot. 2: 276. 1843), undescribed, belongs here.

Schumann refers *Echinocactus auratus* Pfeiffer (Abbild. Beschr. Cact. 2: under pl. 14. 1846 to 1850) and its synonym *Echinopsis aurata* Salm-Dyck (Cact. Hort. Dyck. 1849. 39. 1850) to *Cereus candicans*, but this can not be, for the descriptions are very different. The former was described as depressed, 12 to 15 inches in diameter, only 4 to 5 inches high, and with 28 ribs. The type locality was Bellavista, Chile. It should be compared with *Eriosyce sandillon* and its relatives.* *Echinopsis dumeliana* Cels (Salm-Dyck, Cact. Hort. Dyck. 1849. 39. 1850) is given as a synonym only; it is doubtless the name referred to by Schumann, but with different spelling.

Figure 195 shows a flower collected by Dr. Rose near Córdoba, Argentina, in 1915.

17. Trichocereus strigosus (Salm-Dyck).

Cereus strigosus Salm-Dyck, Hort. Dyck. 334. 1834.
Cereus intricatus Salm-Dyck, Cact. Hort. Dyck. 1849. 194. 1850.
Echinocereus strigosus Lemaire in Förster, Handb. Cact. ed. 2. 826. 1885.
Echinocereus strigosus spinosior Rümpler in Förster, Handb. Cact. ed. 2. 827. 1885.
Echinocereus strigosus rufispinus Rümpler in Förster, Handb. Cact. ed. 2. 827. 1885.
Echinocereus intricatus Rümpler in Förster, Handb. Cact. ed. 2. 830. 1885.
Cereus strigosus intricatus Weber in Schumann, Gesamtb. Kakteen 68. 1897.
Cereus strigosus longispinus Maass, Monatsschr. Kakteenk. 15: 119. 1905.

Cespitose, forming clumps 2 to 10 dm. in diameter, the branches usually simple, erect, or ascending, sometimes 6 dm. high, 5 to 6 cm. in diameter, very spiny; ribs 15 to 18, very low, 4 to 5 mm. high, obtuse; areoles circular, rather large, approximate, 4 to 8 mm. apart, densely white-felted when young; spines numerous, very variable as to color and length, either white, yellowish, or pinkish to nearly black, 1 to 5 cm. long, acicular; flowers white, large, 20 cm. long, funnelform, the scales on the ovary and tube with long silky hairs in their axils; seeds black, glossy, about 2 mm. long; hilum basal but oblique.

Type locality: Not cited.

Distribution: Western Argentina.

This species is very common in the deserts of the Province of Mendoza, especially about the city of Mendoza, and in the mountain valleys farther to the west. The first specimens were doubtless sent out through Chile, for before the railroads this was the most accessible route out from Mendoza.

Cereus myriophyllus Gillies (Allg. Gartenz. 1: 365. 1833), given by Schumann as a synonym of this species, was never described and the name was referred here originally with

* We have found that *Echinocactus ceratistes* Otto, one of the synonyms of *Eriosyce*, originally came from Bellavista, Chile, also.

doubt. *C. strigosus spinosior* Salm-Dyck (Cact. Hort. Dyck. 1844. 27. 1845) and *C. strigosus rufispinus* (Monatsschr. Kakteenk. 7: 184. 1897) also belong here, and, perhaps, *C. spinibarbis flavidus* (Labouret, Monogr. Cact. 325. 1853).

Illustration: Rep. Mo. Bot. Gard. 16: pl. 8, f. 1, as *Cereus strigosus.*

Figure 211 is from a photograph taken by Dr. Shafer at Andalgala, Argentina, in 1916.

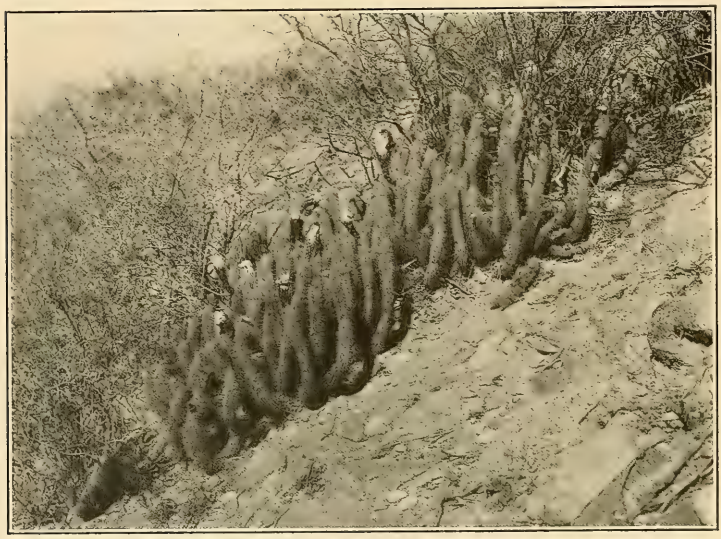


FIG. 211.—Trichocereus strigosus.

18. Trichocereus shaferi sp. nov.

Cespitose, cylindric, 3 to 5 dm. high, 10 to 12.5 cm. in diameter, light green; ribs about 14, 10 to 15 mm. high; areoles approximate, 5 to 7 mm. apart, white-felted when young; spines about 10, acicular, 12 mm. long or less, light yellow; flowers from the top of plant, 15 to 18 cm. long; tube slender; outer perianth-segments linear; inner segments probably white; scales of the ovary and flower-tube bearing long brown hairs.

Collected by J. A. Shafer in wooded ravine, altitude 1,800 meters, near San Lorenzo, Salta, Argentina, January 11, 1917 (No. 44).

19. Trichocereus schickendantzii (Weber).

Echinopsis schickendantzii Weber, Dict. Hort. Bois 473. 1896.

Plants simple or cespitose, slender, 15 to 25 cm. high, 6 cm. in diameter, dark green, shiny; ribs 14 to 18, low, 5 mm. high, somewhat crenate; spines yellowish, flexible, 5 to 10 mm. long; radial spines at first 9, in age more numerous; central spines 2 to 8; flower-bud pointed, covered with black wool; flowers funnelform, several from the top of the plant, inodorous, 20 to 22 cm. long; scales on the ovary and flower-tube with hairy axils; inner perianth-segments acute, oblong, white; fruit edible, agreeable.

Type locality: Tucuman, Argentina.

Distribution: Northwestern Argentina.

Spegazzini thinks it is not an *Echinopsis* but a *Cereus*, although he leaves it under the former genus. The flowers are not those of a true *Cereus.*

Weber (Dict. Hort. Bois 473. 1896) gives *Cereus schickendantzii* Weber as a synonym.

Illustration: Monatsschr. Kakteenk. 15: 125, as *Echinopsis schickendantzii.*

PUBLISHED SPECIES, PERHAPS REFERABLE TO TRICHOCEREUS.

CEREUS AREQUIPENSIS Meyen, Allg. Gartenz. 1: 211. 1833.

This may be a *Trichocereus*; we give a translation of Meyen's account of it:

"The number of cacti here, as well as in the southern provinces of Peru, is unusually large, and only a few of them are known in our greenhouses, also it is very difficult to transport them to us, as many of them die in the trip around Cape Horn. *Cactus candelaris*, which we first found in the Cordilleras of Tacna, appears here also, in isolated examples, and its distribution appears to be sharply confined between 7,000 and 9,000 feet altitude. However, close upon its heels comes another *Cereus* which surpasses it in beauty; it is 8-angled and reaches a height of 20 to 35 feet; upon its ribs appear at regular distances hairy areoles, from which protrude the spine clusters and the long white flowers. There is no more beautiful plant in this remarkable family, and we name it *Cereus arequipensis*."—Meyen, Reise 2: 41. 1835.

CEREUS ATACAMENSIS Philippi, Fl. Atac. 23. 1860.

Usually simple and columnar, 6 meters high or more, 5 to 7 dm. in diameter, containing a thick woody cylinder; ribs numerous, very spiny; areoles 1.2 cm. in diameter, filled with brown wool; spines numerous, sometimes 30 to 40, often very slender, 10 cm. long.

Type locality: Mines of "San Bartolo."

Distribution: Province of Atacama, Chile.

The original specimen came from the desert of northern Chile, not far from the Bolivian line; it is not unlikely that the plant extends into Bolivia and northern Argentina. Indeed, Dr. Rose found a large woody section in the Museo Nacional del Santiago bearing this name and coming from Argentina. This material, supplemented by the illustration by Reiche from Chile and by Fries (Nov. Act. Soc. Sci. Upsal. IV. 1: pl. 4, 5. 1905) from Argentina, suggests the probability of *Trichocereus pasacana* belonging here.

In the Museo Nacional del Santiago are two very interesting wood sections of this species. One from Atacama is 1.55 meters long and 41 cm. in diameter, while the other, from Argentina, is 3 meters long and 44 cm. in diameter, with a hollow center 22 cm. in diameter. All that is left of the type material in the Philippi herbarium are two clusters of spines, these very long, slender, numerous, and brown.

Illustration: Engler and Drude, Veg. Erde 8: pl. 9, as *Cereus atacamensis*.

CEREUS ERIOCARPUS Philippi, Anal. Mus. Nac. Chile 1891[2]: 27. 1891.

Stems large, erect, simple below, with small branches above, 5 to 6 cm. in diameter, the upper part densely covered with white curly hairs; ribs 27 to 29; areoles very close together, 14 mm. in diameter, with grayish tomentum intermixed with straight spines 11 cm. long, grading into stiff bristles 4 cm. long; expanded flowers unknown; ovary 22 mm. in diameter, densely covered with white hairs.

Type locality: Calcalhuay, altitude 12,000 feet (3,700 meters).

Distribution: Province of Tarapaca, Chile.

We know the plant only from description and from fragments of the type specimen.

CEREUS MALLETIANUS Cels in Schumann, Gesamtb. Kakteen 120. 1897.

"Stem upright, cylindric, somewhat crooked, slightly constricted above, hardly sunken in at the crown, exceeded by a brownish yellow thick tuft of spines which can not be seen under the wool, up to 4 cm. in diameter, bluish green; ribs 17, separated by sharp shallow furrows, hardly 4 mm. high, rounded and lightly sinuate, disappearing at the base; areoles 6 to 8 mm. apart, circular, 3 to 3.5 mm. in diameter, covered with short yellow wool, later turning gray, which gradually disappears; radial spines about 30, radiating horizontally, the inner spreading, needle-like, so thickly intertwined that they surround the entire body, the inner pair the longest, measuring 10 mm.; central spines 4, in an upright cross, sometimes more, since they are not sharply distinguishable from the radial spines, the lowermost, sometimes, however, the uppermost, the longest, measuring up to

2 cm., this one is yellowish brown, darker above; the remaining spines are yellowish when young, then become white, almost translucent, finally they turn gray and are knocked off." (Translation of Schumann's description.)

Type locality: Not definitely cited.
Distribution: Andes, South America.

ECHINOPSIS CATAMARCENSIS Weber, Dict. Hort. Bois 471. 1896.

Echinocactus catamarcensis Spegazzini, Anal. Mus. Nac. Buenos Aires III. 4: 500. 1905.

Stems simple, ellipsoid to shortly columnar, up to 1 meter high, grayish green; ribs 13 to 17, high, somewhat undulate; radial spines 10, pale brown, subulate, somewhat curved; central spines 4, arranged in a single perpendicular row, somewhat curved; flowers supposed to be yellow.

Type locality: Catamarca, Argentina.
Distribution: Argentina.
Weber gives *Cereus catamarcensis* (Dict. Hort. Bois 471) as a synonym of this species.

25. JASMINOCEREUS gen. nov.

Stems upright and tall with a definite cylindric trunk and a much branched top; ribs numerous, low; areoles circular, bearing felt and spines; flowers slender, salverform or perhaps funnelform, the slender tube narrowly cylindric, the limb broad, spreading; inner perianth-segments narrow, yellow or brownish; stamens and style exserted; ovary bearing small spreading scales with small tufts of wool in their axils; fruit oblong, smooth, except the small scarious scales, these naked in their axils; seeds minute, black.

A monotypic genus of the Galápagos Islands. The name signifies jasmine-like cereus, with reference to the flowers.

FIG. 212.—Jasminocereus galapagensis.

1. Jasminocereus galapagensis (Weber).

Cereus galapagensis Weber, Bull. Mus. Hist. Nat. Paris 5: 312. 1899.
Cereus sclerocarpus Schumann in Robinson, Proc. Amer. Acad. 38: 179. 1902.

Tall, often 8 meters high or more; trunk large, cylindric, 15 to 30 cm. in diameter; branches spreading, very stout, composed of many short joints, about 14 cm. in diameter; ribs 15 to 18, low,

about 1 cm. high, separated by broad, rounded intervals; areoles rather close together, 1 cm. apart or less, bearing brown felt; spines various as to length, sometimes only 1 cm. long, sometimes 8 cm. long, usually slender, sometimes bristle-like, often 10 or more at an areole; flowers various in size, 5 to 11 cm. long, "chocolate-brown with yellow stripes"; outer perianth-segments spatulate, 2 to 3 cm. long; inner perianth-segments linear, about 2.4 to 3 cm. long; ovary terete, scaly; scales few, 1 to 1.5 mm. long, ovate, acute; stigma-lobes 11; flower-tube about twice as long as the segments; fruit greenish, short-oblong, 5 cm. long, 4 cm. in diameter, with a thin tough rind, palatable.

Type locality: St. Charles Island, Galápagos.

Distribution: Various islands of the Galápagos group.

This species and the other cacti of the Galápagos Islands were discovered by Charles Darwin in 1835. He associated this species with *Cereus peruvianus*, which it resembles only in its large cylindric trunk. The various collectors who have since visited these islands have noted this striking plant, but little material has been collected and even to-day our knowledge is very limited.

W. Botting Hemsley has written most interestingly of the cactus flora of the islands (Gard. Chron. III. 24: 265, 266. 1898; 27: 177, 178. 1900).

Mr. Alban Stewart, who made extensive collections in the Galápagos Islands in 1905 and 1906, discusses the cacti in considerable detail (Proc. Calif. Acad. Sci. IV. 1: 107 to 115). He recognizes two columnar arborescent species under the names *Cereus galapagensis* Weber and *Cereus sclerocarpus* Schumann, and indicates that they may be distinguished by habit characters, but remarks particularly on the great variability of the flowers of both.

Illustrations: Proc. Calif. Acad. Sci. IV. 1: pl. 6, 16, as *Cereus sclerocarpus*; Gard. Chron. III. 27: 185. f. 61, as *Cereus* sp.; Wolf, Geographia y Geologia del Ecuador f. 41, pl. 11; Bull. Mus. Comp. Zool. 23: pl. 16, 20.

Figure 212 is from a photograph of the plant in its natural habitat on Charles Island, Galápagos, contributed by the United States Fish Commission; figures 213 and 214 show flowers drawn from an herbarium specimen in the collection of the California Academy of Sciences, collected by Alban Stewart (No. 2097) in 1905 and 1906.

FIGS. 213 and 214.—Flowers of J. galapagensis. X0.6.

26. HARRISIA Britton, Bull. Torr. Club 35: 561. 1908.

Eriocereus Riccobono, Boll. R. Ort. Bot. Palermo 8: 238. 1909.

Night-flowering cacti with slender, branched stems, the branches fluted or angled, each areole with several acicular spines; flowers borne singly at areoles near the ends of the branches, funnel-form, large, with a cylindric, scaly tube as long as the limb or longer; buds globose, ovoid or obovoid, the scales subtending areoles which bear tufts of long or short hairs, persistent or sometimes deciduous as the flower expands; outer perianth-segments mostly pink or greenish, linear to lanceolate; inner perianth-segments white or pinkish; stamens shorter than the perianth; ovary and young fruit tubercled; style somewhat longer than the stamens; fruit globose to obovoid-globose, spineless or spiny, but with mostly deciduous scales, the corolla withering-persistent; seeds numerous, small.

The genus is named in honor of William Harris, superintendent of Public Gardens and Plantations of Jamaica, distinguished for his contributions to the knowledge of the flora of that island.

We recognize 17 species, distributed from Florida and the Bahamas and the Greater Antilles to Argentina. The type species is *Cereus gracilis* Miller.

The vegetative characters of the first 9 species here recognized, natives of Florida and the West Indies, are very much alike; their showy yellow or orange-red fruits are edible. The young stem-areoles are subtended by subulate small deciduous leaves in several species.

FIG. 215.—Harrisia eriophora.

KEY TO SPECIES.

A. Fruit yellow or orange-red, not splitting (*Euharrisia*).
  B. Plants erect.
    Hairs of the flower-areoles white.
      Perianth-segments entire.
        Hairs of the flower-areoles copious, 1 to 1.5 cm. long.
          Fruit yellow ..... 1. *H. eriophora*
          Fruit orange-red ..... 2. *H. fragrans*
        Hairs of the flower-areoles few and short.
          Flower-buds depressed-truncate; fruit yellow ..... 3. *H. portoricensis*
          Flower-buds pointed.
            Flower-buds obovoid, short-pointed; color of fruit unknown ..... 4. *H. nashii*
            Flower-buds ovoid, very long-pointed; fruit yellow ..... 5. *H. brookii*
      Perianth-segments denticulate.
        Fruit yellow ..... 6. *H. gracilis*
        Fruit orange-red ..... 7. *H. simpsonii*
    Hairs of the flower-areoles tawny or brown.
      Hairs of the flower-areoles 1 to 1.5 cm. long; color of fruit unknown; spines up to 6 cm. long ..... 8. *H. fernowi*
      Hairs of flower-areoles 7 mm. long or less; fruit yellow; spines much shorter ..... 9. *H. aboriginum*
  BB. Plants prostrate and pendent on rocks ..... 10. *H. earlei*
AA. Fruit red, often splitting (*Eriocereus*).
  Joints several-ribbed or subterete.
    Ribs of the joints prominent.
      Ribs not tubercled.
        Plants bright green ..... 11. *H. tortuosa*
        Plants bluish green ..... 12. *H. pomanensis*
      Ribs of old joints strongly tubercled.
        Central spine 1, much longer than radial spines ..... 13. *H. martinii*
        Spines of nearly the same length ..... 14. *H. adscendens*
    Ribs of the joints low and broad ..... 15. *H. platygona*
  Joints 3 to 5-angled.
    Scales of the perianth-tube copiously woolly in the axils ..... 16. *H. bonplandii*
    Scales of the perianth-tube scarcely woolly in the axils ..... 17. *H. guelichii*

M. E. Eaton del.

1. Tip of a flowering branch of *Harrisia eriophora*.
2. Fruiting branch of the same.
(Natural size.)

1. Harrisia eriophora (Pfeiffer) Britton, Bull. Torr. Club 35: 562. 1908.

(?) *Cereus cubensis* Zuccarini in Seitz, Allg. Gartenz. 2: 244. 1834.
Cereus eriophorus Pfeiffer, Enum. Cact. 94. 1837.

Plant 3.5 dm. high or less, the young joints bright green, the main stem 4 cm. in diameter or more, the branches nearly as thick, erect or ascending, 8 or 9-ribbed, the ribs prominent, the depressions between them rather deep; areoles 2 to 4 cm. apart; spines 6 to 9, the longer ones 2.5 to 4 cm. long, light brown with nearly black tips; buds ovoid, sharp-pointed, their scales subtending tufts of bright white-woolly hairs 1 to 1.5 cm. long; flowers 12 to 18 cm. long; scales of the tube lanceolate, acuminate, appressed, 1 to 1.5 cm. long, subtending long white hairs; outer perianth-segments pale pink outside, the outermost greenish; inner segments pure white, tipped with a hair-like cusp 5 mm. long; filaments white; anthers oblong, yellow; pistil cream-colored; fruit subglobose, yellow, about 6 cm. in diameter, edible.

Type locality: Cuba.

Distribution: Central and western Cuba and Isle of Pines.

The names *Cereus eriophorus laeteviridis* and *C. repandus laetevirens* (Salm-Dyck, Hort. Dyck. 335. 1834), both unpublished, may belong here.

The flower-buds, copiously covered with bright white wool, are conspicuous.

Plants grown in the Habana Botanical Garden, formerly referred to *Cereus undatus* (Bull. Torr. Club 35: 564), apparently belong to this species.

Illustration: Pfeiffer and Otto, Abbild. Beschr. Cact. 1: pl. 22, as *Cereus eriophorus*.

Plate XVIII, figure 1, shows the flower of a plant from Mariel, Cuba, painted at the New York Botanical Garden, July 12, 1912; figure 2 shows a fruiting branch of a plant sent by C. F. Baker in 1907. Figure 215 is from a photograph taken by C. S. Gager at Mariel, Cuba, in 1910.

FIG. 216.—Harrisia fragrans.

2. Harrisia fragrans Small, sp. nov.

Plants 5 meters tall or less, the stems erect, reclining or clambering prominently, 10 to 12-ridged, the ridges more or less depressed between the areoles, the grooves rather deep and sharp; areoles about 2 cm. apart; spines acicular, 9 to 13 in each areole, mostly grayish and yellowish at the tip, one of each areole longer than the others, mostly 2 to 4 cm. long; young buds copiously white-hairy; flowers 12 to 20 cm. long, odorous; ovary bearing subulate or lanceolate-subulate scales subtending long white hairs; scales of the flower-tube few and remote, subulate, slenderly acuminate, not turgid,

with a tuft of long white hairs in each axil; outer perianth-segments very narrowly linear, slenderly acuminate; inner perianth-segments white or pinkish, spatulate, caudate-tipped; fruit obovoid or globose, about 6 cm. in diameter, dull red, with tufts of long hairs persistent with the scale-bases.

Coastal sand-dunes, Brevard and St. Lucie Counties, Florida. Type collected by John K. Small on sand-dunes 6 miles south of Fort Pierce, December 1917.

Plants, taken to the cactus plantation of Mr. Charles Deering at Miami, Florida, in 1917, flowered and fruited in April 1918.

Plate XIX, figure 1, shows a flowering top of a plant from an island east of Malabar, Florida, brought to the New York Botanical Garden by Dr. Small in 1903; figure 2 shows its fruit. Figure 216 is from a photograph of the plant in the cactus garden of Mr. Charles Deering, Miami, Florida, taken by Dr. Small.

3. **Harrisia portoricensis** Britton, Bull. Torr. Club **35**: 563. 1908.

Cereus portoricensis Urban, Symb. Ant. **4**: 430. 1910.

Plant slender, 2 to 3 meters high, little branched, the branches nearly erect, 3 to 4 cm. thick, 11-ribbed, the ribs rounded, the depressions between them shallow; areoles 1.5 to 2 cm. apart; spines 13 to 17, grayish white to brown with dark tips, the longer ones 2.5 to 3 cm. long; bud obovoid, depressed-truncate, its areoles with many curled white hairs 6 mm. long or less; flower about 1.5 dm. long; outer perianth-segments pinkish green inside, the inner white; scales of the flower-tube lanceolate, appressed, 1.5 cm. long, the areoles loosely hairy, the hair completely deciduous in flakes; fruit ovoid to globose, yellow, tubercled, becoming smooth or nearly so, 4 to 6 cm. in diameter.

FIG. 217.—Harrisia portoricensis.

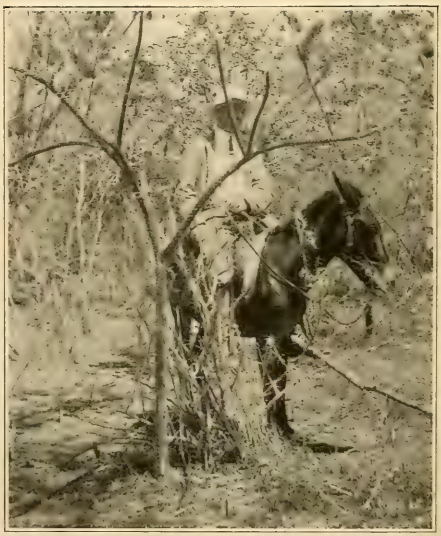


FIG. 218.—Harrisia nashii.

Type locality: Near Ponce, Porto Rico.

Distribution: Type locality and vicinity, and on the islands Mona and Desecheo.

Plate XVII, figure 3, shows a fruiting branch of the plant from the type locality, painted at the New York Botanical Garden in 1914. Figure 217 is from a photograph taken at the type locality by Delia W. Marble in 1913.

M. E. Eaton del.

1. Top of flowering branch of *Harrisia fragrans*.
2. Top of fruiting joint of *Harrisia fragrans*.
3. Fruiting branch of *Harrisia martinii*.

(All natural size.)

4. **Harrisia nashii** Britton, Bull. Torr. Club **35**: 564. 1908.

?*Cereus divergens* Pfeiffer, Enum. Cact. 95. 1837.
Cereus nashii Vaupel, Monatsschr. Kakteenk. **23**: 27. 1913.

Slender, erect, 2 to 3 meters high; branches widely divergent, light green, 3 to 4 cm. thick, 9 to 11-ribbed, the ribs rounded; areoles 2 to 2.5 cm. apart; spines only 3 to 6, gray, the longer ones 15 mm. long; bud narrowly obovoid, obtuse, very short-pointed, its scales subtending many curled white hairs 6 mm. long or less; flower 1.6 to 2 dm. long; scales of the flower-tube linear, acuminate, 1.5 cm. long, subtending a few hairs; fruit ellipsoid, 6 to 8 cm. long, 4 to 5 cm. thick, very strongly tubercled, at least when immature, the conic tubercles 6 to 8 mm. high.

Type locality: Between Gonaives and Plaisance, Haiti.

Distribution: Arid parts of Hispaniola.

Cereus divergens Pfeiffer is known only from the description of a sterile plant.

Cereus divaricatus De Candolle (Prodr. **3**: 466. 1828; *Cactus divaricatus* Lamarck, Encycl. **1**: 540. 1783; *Pilocereus divaricatus* Lemaire, Rev. Hort. **1862**: 427. 1862) is based upon Plumier's plate 193, which can not be certainly associated with any known cactus.

Figure 218 is from a photograph by Paul G. Russell near Azua, Santo Domingo, in 1913.

Here perhaps is to be referred *Cactus fimbriatus* Lamarck (Encycl. **1**: 539. 1783; *Cereus fimbriatus* De Candolle, Prodr. **3**: 464. 1828; *Pilocereus fimbriatus* Lemaire, Rev. Hort. **1862**: 427. 1862) and *Cereus serruliflorus* Haworth (Phil. Mag. **7**: 113. 1830), both of which were based on Burmann's plate of Plumier (pl. 195, f. 1, A, B, C, and D), found along the coast of Haiti under the name of la bande du sud. *Cactus fimbriatus* Descourtilz (Fl. Med. Antill. ed. 2. **6**: 160. pl. 419), which refers to the same plate of Plumier, is really based upon pl. 195, f. 2, of Burmann, and is probably a *Lemaireocereus*.

5. **Harrisia brookii** Britton, Bull. Torr. Club **35**: 564. 1908.

Cereus brookii Vaupel, Monatsschr. Kakteenk. **23**: 24. 1913.

Plant 5 meters high, much branched, light green; branches 3 to 4 cm. thick, 10-ribbed, the ribs sometimes prominent, with deep depressions between them; areoles about 2 cm. apart; spines 9 to 12, the longer ones 2 to 2.5 cm. long; young upper spines of areoles brown, others white; bud ovoid, prominently long-pointed, its scales with few curled white hairs 7 to 10 mm. long; fruit yellowish, ellipsoid or subglobose, about 8 cm. in diameter, rounded at both ends, the tubercles very low, with tips only 1.5 mm. high, the linear scales persistent.

Type locality: Clarence Town, Long Island, Bahamas.

Distribution: Long Island, Bahamas.

Figure 219 shows a fruit of the type plant; figure 220 shows a flower-bud of the same.

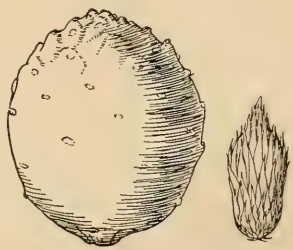


FIG. 219.—Fruit of Harrisia brookii. ×0.6.
FIG. 220.—Flower-bud of same. ×0.6.

6. **Harrisia gracilis** (Miller) Britton, Bull. Torr. Club **35**: 563. 1908.

Cereus gracilis Miller, Gard. Dict. ed. 8, No. 8. 1768.
Cactus gracilis Weston, Bot. Univers. **1**: 33. 1770.
Cereus repandus Haworth, Syn. Pl. Succ. 183. 1812. Not *Cactus repandus* Linnaeus, 1753.
Cereus subrepandus Haworth, Suppl. Pl. Succ. 78. 1819.
Cereus undatus Pfeiffer, Enum. Cact. 94. 1837. Not Haworth, 1830.
Harrisia undata Britton, Bull. Torr. Club **35**: 564. 1908.
Eriocereus subrepandus Riccobono, Boll. R. Ort. Bot. Palermo **8**: 243. 1909.

Plant much branched, often 7 meters high, dark green, its branches rather slender, somewhat divergent, 9 to 11-ribbed, the ribs rounded, the depressions between them rather shallow; areoles 1.5 to 2 cm. apart; spines 10 to 16, whitish with black tips, the longer 2 to 2.5 cm. long; bud oblong-ovoid, short-pointed, its scales subtending a few straight white hairs 8 to 12 mm. long; corolla 2 dm. long, the scales of its tube greenish brown, narrowly lanceolate, abruptly bent upward near the base, acuminate, about 2 cm. long, subtending a few hairs, the outer perianth-segments pale brown, the inner white, denticulate (or sometimes entire?); fruit depressed-globose, yellow, about 5 cm. long,

6 to 7 cm. thick, the base flat, the top bluntly pointed, strongly tubercled when young, the tubercles low-conic, about 4 mm. high, about 1.5 cm. from tip to tip, bearing a deciduous triangular-lanceolate scale 6 to 8 mm. long, becoming confluent, the fruit finally smooth or nearly so, yellow.

Type locality: British Islands of America.

Distribution: Jamaica.

The following names were referred to *Cereus repandus* as synonyms by Schumann:

Cereus tinei Todaro (Ind. Sem. Hort. Panorm. 39. 1857; *C. cossyrensis* Tineo in Todaro, Ind. Sem. Hort. Panorm. 39. 1857), said to have come from Brazil, and *Cereus erectus* Pfeiffer (Enum. Cact. 95. 1837), stated definitely to have come from Mexico.

Illustrations: Trew, Pl. Select. pl. 14, as *Cereus* etc.; Loudon, Encycl. Pl. 411. f. 6862; Edwards's Bot. Reg. 4: pl. 336, as *Cactus repandus*; De Candolle, Mém. Mus. Hist. Nat. Paris 17: pl. 13, as *Cereus repandus;* Pfeiffer and Otto, Abbild. Beschr. Cact. 1: pl. 23, as *Cereus undatus.*

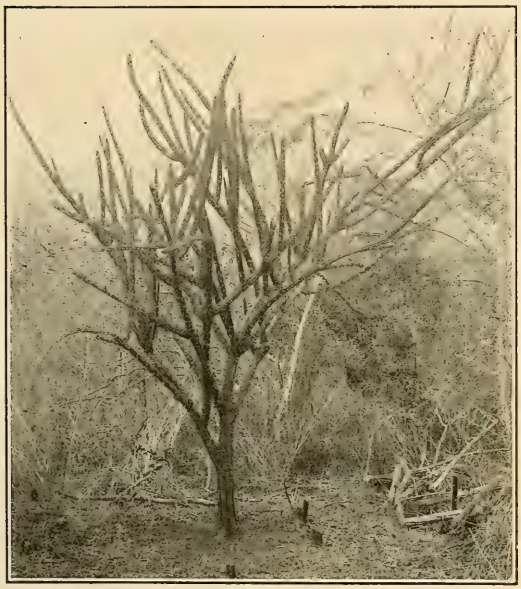


FIG. 221.—Harrisia gracilis.

FIG. 222.—Flower of Harrisia gracilis.

Plate XX, figure 1, shows a fruiting branch of a plant in the the New York Botanical Garden. Figure 221 is from a photograph taken in Jamaica, contributed by William Harris; figure 222 is copied from the last illustration above cited.

7. Harrisia simpsonii Small, sp. nov.

Plants up to 6 meters high, erect, reclining, or spreading, simple or more or less branched; ribs 8 to 10; areoles 1 to 2 cm. apart; spines 7 to 14, gray when mature, 1 to 2.5 cm. long; buds white-hairy; flowers 12 to 17 cm. long; scales of the ovary lanceolate-subulate, subtending few white hairs 10 mm. long or less; scales of the flower-tube lanceolate, distant; outer perianth-segments linear; inner perianth-segments spatulate, acute or acuminate, erose-denticulate; fruit depressed-globose, orange-red, 4 to 6 cm. in diameter.

M. E. Eaton del.

1. Part of fruiting branch of *Harrisia gracilis*.
2. Top of flowering branch of *Harrisia martinii*.
(Natural size.)

Found on Hammocks, Keys of Florida, and southern mainland coast. Type from between Cape Sable and Flamingo, collected by John K. Small, November 29, 1916.

The species is dedicated to Charles Torrey Simpson, naturalist, long resident in Florida.

Flowers of a plant from Pumpkin Key, grown at the cactus garden of Mr. Charles Deering, Miami, Florida, and at the New York Botanical Garden, have the flower-tube little, if any, longer than the limb; the stems of this plant and its fruit are not different from those of the type, but are smaller, about 2 meters high.

Figure 223 is from a photograph taken by Mr. C. L. Pollard on Key Largo, Florida.

FIG. 223.—Harrisia simpsonii.

FIG. 224.—Harrisia taylori.

8. **Harrisia fernowi** Britton, Bull. Torr. Club 35: 562. 1908.

Cereus pellucidus Grisebach, Cat. Pl. Cub. 116. 1866. Not *C. pellucidus* Otto, 1837.

Plant 2.5 to 3 meters high; branches slender, about 2.5 cm. thick, light green, 9-ribbed, the ribs not prominent, the depressions between them shallow; areoles about 2 cm. apart; spines 8 to 11, light brown with blackish tips, the longer ones 6 cm. long; bud subglobose-ovoid, its scales subtending and rather densely covered with tawny, curled woolly hairs 1 cm. long; flower nearly 2 dm. long, its ovary and tube bearing oblong-lanceolate, acute scales 1 to 2 cm. long, subtending tufts of long brown hairs; outer perianth-segments linear, acuminate, the inner white, spatulate, entire, short-acuminate.

Type locality: Between Rio Grande and Rio Ubero, Oriente, Cuba.

Distribution: Dry parts of Oriente Province, Cuba.

Plate XXIV, figure 1, shows a flowering branch of the type plant from a painting made at the New York Botanical Garden, July 9, 1912.

8*a*. **Harrisia taylori** Britton, Bull. Torr. Club 35: 565. 1908.

Cereus taylori Vaupel, Monatsschr. Kakteenk. 23: 37. 1913.

Plant light green, branched above, 1.5 to 2 meters high, the branches divaricate-ascending, rather stout, 4 to 5 cm. thick, 9-ribbed, the ribs rounded, the depressions between them rather deep;

areoles 2 to 3 cm. apart; spines 9 to 12, the longer 3 to 5 cm. long, ascending; bud globose-ovoid, short-pointed, its scales with sparse curled grayish-white wool, 3 to 6 mm. long.

Type locality: Sea-beach between Rio Grande and Rio Ubero, Oriente, Cuba.

Distribution: Known only from the type locality.

This plant was collected near the type locality of the preceding species; specimens of the two appeared to be different when first studied, but subsequent observations indicate that they may not be distinct; additional evidence is needed to determine this question.

Figure 224 is from a photograph of the type plant in its natural environment.

9. Harrisia aboriginum Small, sp. nov.

Plants 6 meters high or less, erect or reclining, simple or branched; ribs 9 to 11, rounded; areoles 1.5 to 3 cm. apart; spines 7 to 9, acicular, mostly 1 cm. long or less, sometimes longer, gray with brown tips when mature, pink when young; flower-buds densely brown-hairy; flowers slightly odorous, about 15 cm. long; scales of the ovary and flower-tube lanceolate, subtending short brown hairs; outer perianth-segments linear, acuminate, the inner oblanceolate, white, caudate-acuminate, erose-denticulate; fruit globular, yellow, 6 to 7.5 cm. in diameter.

On shell-mounds, western coast of Florida, north of the Ten Thousand Islands to Tampa Bay. Type collected by John K. Small on Terra Ceia Island, April 1919.

The type plants were found growing in shell heaps formed by the aborigines, whence the specific name.

10. Harrisia earlei sp. nov.

Pendent and prostrate on limestone rocks, 2 to 3 meters long, dark green, the old stems nearly or quite terete, 4 to 6 cm. in diameter and smooth, the younger branches 2 to 3 cm. in diameter, 5 to 7-angled, with spine-bearing areoles 2 to 4 cm. apart; spines gray, acicular, 5 to 8 at each areole, the longer 4 to 5 cm. long, ascending; flowers about 2 dm. long, the slender greenish tube about as long as the limb; ovary about 1 cm. in diameter, tubercled, bearing short subulate leaves, the areoles with short, white hairs; perianth-tube bearing distant, linear, acuminate scales 1 to 3 cm. long, the areoles with white hairs 1 to 1.5 cm. long; outer perianth-segments linear, greenish, acuminate, the inner somewhat broader, white, acute or acuminate; fruit yellow, depressed-globose, tubercled when young, nearly smooth when old, 6 to 7 cm. in diameter.

Limestone rocks, province of Pinar del Rio, Cuba. Type from San Diego de los Baños, August 31, 1910, collected by Britton, Earle, and Gager (No. 6667).

In habit and vegetative characters intermediate between typical *Harrisiae* and *Eriocerei*.

11. Harrisia tortuosa (Forbes).

Cereus tortuosus Forbes, Allg. Gartenz. **6**: 35. 1838.
Cereus arendtii Hildmann and Mathsson in Schumann, Monatsschr. Kakteenk. **4**: 173. 1894.
Eriocereus tortuosus Riccobono, Boll. R. Ort. Bot. Palermo **8**: 245. 1909.

Stem at first erect but soon arching, the slender, bright green branches 2 to 4 cm. thick; ribs few, usually 7, low, rounded, sometimes tuberculate, bright green; spines 6 to 10, subulate, the central one longer than the radials; flowers 12 to 15 cm. long; scales of the ovary and flower-tube ovate, about 1 cm. long, acute, bearing hair in their axils; outer perianth-segments narrow, dull colored; inner perianth-segments broader than the outer, acute, white to pink; stamens scarcely exserted; stigma-lobes green; fruit globular, tuberculate, red, 3 to 4 cm. in diameter, its areoles bearing a few short spines.

Type locality: Buenos Aires, Argentina.

Distribution: Argentina.

Riccobono gives as a synonym of this species *Cereus atropurpureus* (Hocay, Cacteencult. 91). Under this name it is also briefly described in the Theodosia B. Shepherd Company's Descriptive Catalogue for 1916.

Cereus davisii (Monatsschr. Kakteenk. **14**: 166. 1904) is an unpublished name; a specimen in the Succulent House at Kew indicates that it is related to *H. tortuosa*.

Illustrations: Monatsschr. Kakteenk. **14**: 89. f. b; Rep. Mo. Bot. Gard. **16**: pl. 9, f. 1; U. S. Dept. Agr. Bur. Pl. Ind. Bull. **262**: pl. 7, all as *Cereus tortuosus*.

Plate XXI, figure 1, shows a flowering branch, figure 2 a fruiting branch, both from plants in the collection of the New York Botanical Garden.

12. Harrisia pomanensis (Weber).

Cereus pomanensis Weber in Schumann, Gesamtb. Kakteen 136. 1897.

Often prostrate or arched, bluish green and glaucous; ribs 4 to 6, rounded, obtuse; radial spines 6 to 8, 1 cm. long; central spine solitary, 1 to 2 cm. long; spines all subulate, when young white or rose-colored; flowers 15 cm. long; outer perianth-segments linear, acute; inner perianth-segments oblong, acutish, probably white; stigma-lobes numerous, linear; scales on ovary and flower-tube ovate, acute.

Type locality: Poman, Catamarca, Argentina.

Distribution: Northwestern Argentina.

There is a living specimen of this species in the New York Botanical Garden (No. 39517). The stem is 4-angled, 2 cm. broad, and light green. The small areoles are 2 cm. apart and the acicular spines are less than 5 mm. long. The plant has not yet flowered.

Cereus bonplandii pomanensis Weber (Schumann, Gesamtb. Kakteen 137. 1897) is given as a synonym of this species. *C. pomanensis grossei* (Graebener, Monatsschr. Kakteenk. **19**: 137. 1909) is only a mentioned name.

Illustrations: Rep. Mo. Bot. Gard. **16**: pl. 7, f. 5, 6, both as *Cereus pomanensis*.

Figure 225 is from a photograph of a flowering branch in the collection of Dr. Spegazzini at La Plata, Argentina.

13. Harrisia martinii (Labouret).

Cereus martinii Labouret, Ann. Soc. Hort. Haute Garonne. 1854.
Eriocereus martinii Riccobono, Boll. R. Ort. Bot. Palermo **8**: 241. 1909.
Cereus martinii perviridis Weingart, Monatsschr. Kakteenk. **24**: 72. 1914.

Plant much branched, clambering, 2 meters long or longer; old stems terete, spineless; young stems vigorous, about 2 cm. thick, pointed, 4 or 5-angled; areoles with a stout central spine 2 to 3 cm. long, straw-colored with a black tip and a row of short radials, sometimes half as long as the central one; flower about 2 dm. long; outer perianth-segments narrow, becoming pinkish, acuminate; inner perianth-segments broader, short-acuminate, white or tinged with pink; style green; ovary tuberculate; scales on ovary ovate, acuminate, on tube similar, becoming more elongate above, all with brown felt in their axils; fruit red, 3.5 cm. long, bearing small scales, the flowers withering-persistent.

Type locality: Not cited.

Distribution: Argentina.

Cereus monacanthus Cels, not Lemaire, is not listed in the Index Kewensis, but it is cited by Schumann (Gesamtb. Kakteen 142. 1897) as a synonym of this species, quoting Cels, Catalogue, 1853. Here may belong *Pilocereus monacanthus* Lawrence in Loudon, Gard. Mag. **17**: 319. 1841.

A plant of this species in the Kew collection is said by Mr. Weingart to be *Cereus regelii* (Monatsschr. Kakteenk. **20**: 33. 1910).

Illustrations: Amer. Gard. **11**: 569; Cycl. Amer. Hort. Bailey **1**: f. 304 (both fruits spineless); Rep. Mo. Bot. Gard. **16**: pl. 10, f. 1, 2; Rev. Hort. **94**: f. 123 to 125, all as *Cereus martinii*.

Plate XIX, figure 3, represents a fruiting branch, and plate XX, figure 2, a flowering branch, both painted from plants in the collection of the New York Botanical Garden.

14. Harrisia adscendens (Gürke).

Cereus adscendens Gürke, Monatsschr. Kakteenk. **18**: 66. 1908.

At first erect, becoming much branched and bushy or sometimes with long clambering branches 5 to 8 meters long, 2 to 5 cm. thick; ribs 7 to 10, low, rounded, broken up into elongated tubercles;

trunk 2 to 4 cm. in diameter, with a woody cylinder, its center coarsely pithy; areoles large, rounded, subtended by small definite leaves like those of *Opuntia;* spines usually 10, stout, 2 to 3 cm. long, swollen at base, when young brownish or yellowish with brown tips; flowers 15 to 18 cm. long, opening at night; perianth-segments white; ovary bearing lanceolate acute scales with long hairs in their axils; fruit red, globular, tuberculate, 5 to 6 cm. in diameter, spineless, bearing scales and felt at the areoles, when mature splitting down on one side; flesh white, juicy; seeds large, black, 3 mm. long.

FIG. 225.—Harrisia pomanensis.

FIG. 226.—Harrisia adscendens.

Type locality: Near Tambury, Bahia, Brazil.

Distribution: In the subarid parts of the state of Bahia, Brazil.

Dr. Rose found this very common in Bahia, Brazil, either growing as a low bush in the open or clambering through bushes (No. 19730).

Illustration: Monatsschr. Kakteenk. **18:** 67, as *Cereus adscendens.*

Figure 226 is from a photograph taken by Paul G. Russell at Barrinha, Bahia, in 1915.

15. Harrisia platygona (Otto).

Cereus platygonus Otto in Salm-Dyck, Cact. Hort. Dyck. 1849. 199. 1850.
Eriocereus platygonus Riccobono, Boll. R. Ort. Bot. Palermo **8:** 242. 1909.

At first erect, but soon spreading; branches slender, 2 cm. in diameter or more, nearly terete, the 6 to 8 ribs flat or hardly elevated, separated only by shallow, narrow depressions, pale green or somewhat bronzed; spines 12 to 15, setaceous, very short, the longest only 12 mm. long; flowers 12 cm. broad; flower-tube 10 cm. long, bearing scales; ovary tuberculate, bearing scales, these woolly in their axils; stigma-lobes 14, linear.

Type locality: Not cited.

Distribution: Not known, probably South America.

M. E. Eaton del.

1. Flowering branch of *Harrisia tortuosa*.
2. Fruiting branch of *Harrisia tortuosa*.
(Natural size.)

This species has only once been reported as flowering, and then by Riccobono; our description of the flowers is based on his. We have studied a small plant in the collection of the New York Botanical Garden.

Illustration: Schumann, Gesamtb. Kakteen f. 19, as *Cereus platygonus*.

16. Harrisia bonplandii (Parmentier).

Cereus bonplandii Parmentier in Pfeiffer, Enum. Cact. 108. 1837.
Cereus balansaei Schumann in Martius, Fl. Bras. 4[2]: 210. 1890.
Eriocereus bonplandii Riccobono, Boll. R. Ort. Bot. Palermo 8: 238. 1909.

Stems slender and weak, at first erect, up to 3 meters high or more, sometimes procumbent, arching or clambering, 3 to 8 cm. in diameter, strongly 4-angled; areoles 2 cm. apart; spines 6 to 8, acicular, the longest 4 cm. long, when young red, in age gray; flowers 15 to 22 cm. long, white, closing soon after sunrise; filaments numerous, borne almost to the base of the tube; style included; stigma-lobes numerous; fruit edible, globular, 4 to 6 cm. in diameter, red, bearing large scales with hairs in their axils, spineless, splitting on the side and exposing the white flesh and black seeds.

FIG. 227.—Harrisia bonplandii.

Type locality: Brazil.

Distribution: Paraguay, Argentina, and Brazil.

This species is widely cultivated, but under different names, one of which is *Cereus acutangulus*. The only specimens from wild plants which we have seen were collected by Thomas Morong at Trinidad, Paraguay, and by J. A. Shafer at Ascencion, Paraguay, and at Salta, Argentina. *Cereus bonplandii brevispinus* (Maass, Monatsschr. Kakteenk. 15: 119. 1905) is only mentioned, but Mr. Weingart says it is identical with the hybrid *Cereus jusbertii*.

Schumann's treatment of *Cereus balansaei* is confusing. In the Gesamtbeschreibung der Kakteen (p. 136) he refers it to *Cereus bonplandii*. In the Nachträge (p. 45) he puts

the Balansa specimen (No. 2504, type) here, but not the name, while in his Keys of the Monograph of Cactaceae (p. 17) he recognizes *C. balansaei* as well as *C. bonplandii*, referring to the former the Argentine species *C. pomanensis*.

Cereus rhodocephalus Lemaire (Cact. Gen. Nov. Sp. 79. 1839) is cited as a synonym of *Cereus bonplandii*.

We do not know *Cereus ureacanthus* Förster, (Hamb. Gartenz. 17:166. 1861); it is recorded as originally from Peru. Förster thought it might come next to *Cereus bonplandii*, but no species of this relationship have heretofore been reported from Peru.

Illustrations: Rep. Mo. Bot. Gard. 16: pl. 10, f. 3, 4, both as *Cereus bonplandii*.

Plate XXIV, figure 2, represents a fruiting branch of a plant in the collection of the New York Botanical Garden. Figure 227 is from a photograph taken by Dr. Shafer at Salta, Argentina, in 1917.

FIG. 228.—Harrisia guelichii.

17. Harrisia guelichii (Spegazzini).

Cereus guelichii Spegazzini, Anal. Mus. Nac. Buenos Aires III. 4: 482. 1905.

Branching, high-climbing on trees, up to 25 meters long, the branches 3 to 5 cm. thick, 3 or 4-angled; ribs acute, undulate; radial spines 4 or 5; central spine 1, stouter than the radials; flowers large, green without; scales on the ovary and flower-tube prominent, nearly naked in their axils; fruit globular, strongly tuberculate, spineless, red, 4 to 4.5 cm. in diameter; pulp white, very sweet, edible.

Type locality: In the Chaco, Argentina.

Distribution: Argentina.

We have a living specimen of this species brought by Dr. Rose from Argentina in 1915; from Dr. Spegazzini's description this must be the most elongated cactus known.

Illustration: Monatsschr. Kakteenk. 19: 19, as *Cereus guelichii*.

Figure 228 is from a photograph of a plant grown in the garden of Dr. Spegazzini, La Plata, Argentina.

PUBLISHED SPECIES, PERHAPS OF THIS GENUS.

CEREUS JUSBERTII Rebut in Schumann, Gesamtb. Kakteen 137. 1897.

Eriocereus jusbertii Riccobono, Boll. R. Ort. Bot. Palermo 8: 240. 1909.

Somewhat erect, from the first more or less branched; ribs 6, usually low, with broad intervals; spines very short, the centrals a little longer than the radials; flowers funnelform; inner perianth-segments white; stigma-lobes numerous, linear, about 12, green; scales on ovary and tube with long hairs in their axils.

This plant, now common in living collections, is generally believed to be a hybrid. Berger says, "According to repeated assurances of Abbé Beguin, it is a hybrid between an *Echinopsis* and a *Cereus* raised by him."

Illustrations: Blühende Kakteen 2: pl. 78; Schumann, Gesamtb. Kakteen f. 32; Möllers, Deutsche Gärt. Zeit. 26: 305.

CEREUS AREOLATUS Mühlenpfordt in Schumann, Gesamtb. Kakteen 100. f. 20. 1897.

Cleistocactus areolatus Riccobono, Bol. R. Ort. Bot. Palermo 8: 264. 1909.

Described as columnar, somewhat branching, with 12 low, acutish ribs; ribs divided into tubercles by transverse lines running down from the areoles; radial spines 9 or 10, acicular; central spines 2 to 4, stouter, subulate; flowers and fruit unknown.

The above name was published in a garden catalogue in 1860, while the plant was listed as *Cereus dumesnilianus* Labouret in Gruson's Catalogue.

This cactus is described from plants which are supposed to have come from the Andes of South America. The species is recognized by Schumann in his monograph and is placed in his series *Graciles* after *Cereus platygonus*. It has been in cultivation in the Berlin Botanical Garden and at La Mortola. From the latter source Dr. Rose obtained a specimen in 1914. This plant may be described as follows:

Ribs 15, low, rounded, with a deep horizontal groove just above the areoles; spines yellowish brown, the 6 to 8 radials acicular, spreading, about 1 cm. long; the central subulate, 2 cm. long, porrect.

CEREUS MAGNUS Haworth, Phil. Mag. 7: 109. 1830.

This species has not been definitely identified. Haworth says it was procured from the captain of a French vessel, who obtained it from Santo Domingo. He describes it as a yard high, with 12 ribs and a very large white flower 6 inches long and open day or night. This does not correspond to any cactus known from Hispaniola. Pfeiffer suggests that it might be a form of *C. eyriesii*, that is an *Echinopsis*. In its large flower, open both day and night, it does agree with that genus.

Cereus microsphaericus Schumann (Fl. Bras. 4^2: 196. 1890) and *C. damazioi* Schumann (Monatsschr. Kakteenk. 13: 63. 1903; 28: 62. 1918) are of this alliance. Both come from near Rio de Janeiro, Brazil.

27. **BORZICACTUS** Riccobono, Boll. R. Ort. Bot. Palermo 8: 261. 1909.

Low, slender cacti, erect or procumbent; ribs usually numerous but sometimes as few as 9, usually low and rounded; spines acicular or in some species subulate; areoles usually approximate, in some species producing wool with the flowers; flowers diurnal, orange to scarlet (in one species said to be white) solitary, narrow; tube-proper very short, smooth within; throat very narrow below, expanded above; limb somewhat spreading; axils of scales on ovary and flower-tube bearing long silky hairs; stamens long and slender, slightly exserted; fruit small, globular, edible.

Type species: *Borzicactus ventimigliae* Riccobono.

This genus is perhaps nearest *Rathbunia* of Mexico, but is of different habit and usually with different spines. The flowers are of much the same shape, but with a different limb, some of the stamens originating near the base of the flower-tube, while the areoles of the ovary and flower bear long silky hairs.

The plants are found in the mountains and hills of Ecuador, Peru, and northern Chile, where they have a remarkable development. The indications are that there are still other species to be referred here. It was named in honor of Professor Antonio Borzi, director of the Botanical Garden of Palermo, Italy. Eight species are here described.

KEY TO SPECIES.

Flowers red.
- Base of throat bearing a mass of hairs within.
  - Ribs few, 8 to 11, prominent ..... 1. *B. sepium*
  - Ribs many, low ..... 2. *B. morleyanus*
- Base of throat naked within.
  - Flowers pinkish, not as narrow as in the next species, their areoles very hairy ..... 3. *B. icosagonus*
  - Flowers dark red, very narrow, their areoles not very hairy ..... 4. *B. acanthurus*

Flowers white ..... 5. *B. decumbens*

Not grouped ..... 6. *B. humboldtii*, 7. *B. plagiostoma*, 8. *B. aurivillus*

1. **Borzicactus sepium** (HBK.).

Cactus sepium Humboldt, Bonpland, and Kunth, Nov. Gen. et Sp. **6**: 67. 1823.
Cereus sepium De Candolle, Prodr. **3**: 467. 1828.
Cleistocactus sepium Weber in Gosselin, Bull. Mens. Soc. Nice **44**: 36. 1904.
Borzicactus ventimigliae Riccobono, Boll. R. Ort. Bot. Palermo **8**: 262. 1909.
Cereus ventimigliae Vaupel, Monatsschr. Kakteenk. **23**: 13. 1913.

Stem slender, simple, columnar, 1.5 meters high, about 4 cm. thick; ribs 8 to 11, crenate, obtuse; areoles 1.5 to 2 cm. apart; radial spines 8 to 10, slender, spreading, 5 to 10 mm. long; central spine solitary, about 2 cm. long; spines all dark red with yellowish bases when young, gray in age; flowers somewhat zygomorphic, about 4 cm. long, 3 cm. broad; scales on ovary and flower-tube woolly in their axils; outer perianth-segments lanceolate, erect, scarlet; inner perianth-segments cuneate, red; pistil slightly exceeding the stamens; stigma-lobes 10, short, greenish; fruit globular, 2 cm. in diameter; flesh of fruit white; seeds numerous.

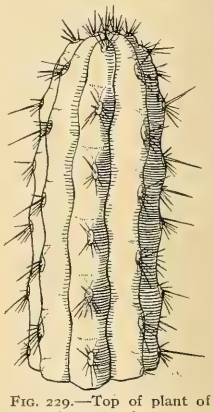


FIG. 229.—Top of plant of Borzicactus sepium. ×0.6.

Type locality: Near Riobamba, at foot of Chimborazo, Ecuador.

Distribution: Dry hills along the interandean valley of Ecuador from San Antonio to Riobamba.

The plant blooms from July to September, while the flowers are said to remain open for 48 hours.

A careful examination of the description of Humboldt's *Cactus sepium* convinces us that it is the same as *Borzicactus ventimigliae*. Not only are the two descriptions similar, but the two types came from the high Andes of Ecuador and a plant sent by Mr. Riccobono from Palermo as *B. ventimigliae* is the same as one sent from the Berlin Botanical Garden as *Cereus sepium*. Dr. Rose, when in Ecuador in 1918, visited Riobamba, but did not see this species there; but he did find it a little north on the hills about Ambato (No. 22389). He also saw what he took to be this species between Ambato and Quito, and, again, collected the species at San Antonio, north of Quito (No. 23557).

The fruit is eaten at Ambato and doubtless elsewhere and is known as muyusa.

Figure 229 shows the top of a plant obtained by Dr. Rose from the Botanical Garden at Palermo, Italy.

2. **Borzicactus morleyanus** sp. nov.

Plant low, growing in clumps, prostrate or with erect branches, sometimes hanging over cliffs or ascending and leaning against rocky banks for support, 4 to 6 cm. in diameter; ribs 13 to 16, low, obtuse, divided into tubercles by V-shaped creases above the areoles; areoles circular, 1 cm. apart or less; spines numerous, 15 to 20, bristly or somewhat acicular, brown, unequal, the longer ones 2.5 cm. long; flowers narrow, 5 to 6 cm. long, slightly oblique; perianth-segments spreading, acute; stamens exserted; filaments purple above, white or tinged with pink below, erect; style cream-colored; stigma-lobes 10, cream-colored.

Very common at Sibambe, Ecuador, where it was collected by J. N. Rose and George Rose, August 29, 1918 (No. 22431, type), and above Huigra, August 28, 1918 (No. 22426).

Here may belong Dr. Rose's plant (No. 22829) from Cuenca, although it has somewhat different spines and perhaps more ribs on the stem.

It is named for Mr. Edward Morley, of Huigra, Ecuador, who greatly aided Dr. Rose in his explorations in Ecuador in 1918.

Figure 230 shows the top of a flowering stem, and figure 231 shows the type, photographed by George Rose.

3. **Borzicactus icosagonus** (HBK.).

Cactus icosagonus Humboldt, Bonpland, and Kunth, Nov. Gen. et Sp. **6**: 67. 1823.
Cereus icosagonus De Candolle, Prodr. **3**: 467. 1828.
Cereus isogonus Schumann, Gesamtb. Kakteen 102. 1897.
Cleistocactus icosagonus Weber in Gosselin, Bull. Mens. Sci. Nice **44**: 34. 1904.

Plants small, procumbent or ascending, 2 to 6 dm. long, 3 to 5 cm. in diameter; ribs 18 to 20, low; areoles approximate; spines bright yellow, numerous, acicular, 1 cm. long or less; flower-buds covered with white wool or hairs; flowers near the end of the branches, 7 to 8 cm. long, pinkish to orange; flower-tube naked at base; perianth-segments oblong, acute, apiculate; scales on the ovary and flower bearing long white and brown hairs in their axils.

Type locality: Near Nabón, Ecuador.

Distribution: In the vicinity of Nabón, Ecuador.

This species has long been a puzzle and so far as we know the only record of its having been previously collected is that of the type at Nabón. Dr. Rose visited Nabón in 1918, where he found this species very abundant on the dry hills. Its range is very circumscribed, for it does not extend very far either north or south of Nabón. It is readily distinguished from the other species of the genus seen in Ecuador in its very dense mass of short yellow spines and its larger lighter-colored flowers. These flowers are very attractive and it is to be hoped that some of the living material sent to New York may produce flowers. The plants, however, had to be carried for a long distance by pack train before being shipped to New York and did not arrive in very good condition. Dr. Rose's plant from Nabón was collected September 25, 1918 (No. 23029). We have tentatively referred here his plant from Tablón de Oña, collected September 27, 1918 (No. 23130), but it has smaller flowers.

Illustration: Schumann, Gesamtb. Kakteen f. 21, as *Cereus isogonus*.

FIG. 230.—Borzicactus morleyanus.

FIG. 231.—Borzicactus morleyanus.

4. **Borzicactus acanthurus** (Vaupel).

Cereus acanthurus Vaupel, Bot. Jahrb. Engler 50: Beibl. 111: 13. 1913.

Plants low, spreading and procumbent, with the tips ascending, sometimes sprawling over the edge of a cliff, with long hanging branches, 1 to 3 dm. long and 2 to 4 cm. in diameter; ribs 15 to 18, very low, rounded, separated by narrow acute intervals; areoles small, approximate; flowering areoles producing tufts of white wool about the flowers; flowers scarlet; tube slender, straight or a little curved, 4 to 5 cm. long; limb about 2.5 cm. broad; inner perianth-segments spreading, acute; filaments white below, scarlet above; style rose-colored, longer than the filaments; stigma-lobes green; fruit globular, 2 cm. in diameter.

Type locality: Matucana, Peru.

Distribution: On the low hills and in the narrow valleys near Lima and along the Rimac River to the east of Lima.

Observed June 1839 at San Cristobal near Lima by A. T. Agate, of the Wilkes' Exploring Expedition. Agate's painting of it is preserved in the Library of the Gray Herbarium.

Plate xxv, figure 3, shows a flowering plant collected at the type locality by Dr. Rose in 1914 which flowered in the New York Botanical Garden in the same year.

5. Borzicactus decumbens (Vaupel).

Cereus decumbens Vaupel, Bot. Jahrb. Engler **50**: Beibl. 111: 18. 1913.

Plant cespitose, procumbent or ascending, forming small clumps; branches slender, 3 to 4 cm. in diameter; ribs numerous, 20, low, almost hidden under the spines, the intervals acute; areoles close together, about 5 mm. apart; radial spines very numerous, about 30, acicular, short, 5 to 8 mm. long, yellowish; central spines usually 5, much longer and stouter than the radials, often 2 to 3 cm. long, subulate; flower 8 cm. long, with a slender cylindric tube gradually expanded into the throat, the limb about 5 cm. broad; perianth-segments described as white, oblong to oblanceolate.

Type locality: Rocky sandy bottoms, Mollendo, Peru.

Distribution: On hills, southwestern Peru, and northwestern Chile.

The type of this species was first collected by Weberbauer in 1902 on the hills about Mollendo, and here Dr. Rose collected living and herbarium specimens in 1914. Old flowers and fruits were obtained, but no flowers have appeared on the living specimens in the New York Botanical Garden.

Three collections made by Dr. Rose in southern Peru are referred here tentatively. One is from near Arequipa, altitude about 7,000 feet, the second is from near Posco, altitude about 2,000 feet, and the third is from hills above Mollendo, altitude about 200 feet, as mentioned above. This is an unusually wide range for a species in this region. The plants themselves show considerable variation, suggesting that more than one species is involved. Until fresh flowers have been obtained it seems best to recognize only the one species.

FIG. 232.—Borzicactus decumbens.

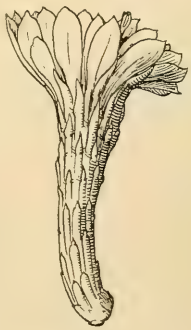


FIG. 233.—Flower of Borzicactus decumbens. ×0.7.

Figure 232 is from a photograph taken by Dr. Rose near Arequipa, Peru, showing this plant in the foreground at the base of a ledge; figure 233 shows a flower collected by Juan Söhrens near Tacna, Chile.

M. E. Eaton del.

Top of flowering plant of *Carnegiea gigantea*.
(Natural size)

6. Borzicactus humboldtii (HBK.).

Cactus humboldtii Humboldt, Bonpland, and Kunth, Nov. Gen. et Sp. **6**: 66. 1823.
Cereus humboldtii De Candolle, Prodr. **3**: 467. 1828.
Cleistocactus humboldtii Weber in Gosselin, Bull. Mens. Soc. Nice **44**: 33. 1904.

Procumbent, cylindric; ribs 10 to 12, low, somewhat tuberculate; spines setose, rigid; flowers red, about 7 cm. long; flower-tube elongated; the scales bearing long greenish gray hairs; perianth-segments lanceolate, acute, red; filaments slender, glabrous; style much longer than the perianth.

Type locality: Between Sondorillo and San Felipe, Peru.
Distribution: Northern Peru and probably southern Ecuador.

The type locality when this species was collected by Humboldt was located in Ecuador, but it is now in northern Peru.

Dr. Rose while collecting in Ecuador in 1918 did not reach Peru, but he found in southern Ecuador near Loja and again in the Catamayo Valley a species of *Borzicactus* which seemed to correspond to *Cactus humboldtii*.

7. Borzicactus plagiostoma (Vaupel).

Cereus plagiostoma Vaupel, Bot. Jahrb. Engler **50**: Beibl. **111**: 20. 1913.

Columnar, erect, or suberect, about 1 meter high, attenuated and rounded at apex; ribs 15, low; areoles close together, orbicular; spines numerous, nearly black; flowers numerous, cylindric but somewhat zygomorphic; ovary bearing many small, ovate, acuminate scales with black felt in axils.

Type locality: San Miguel, Department of Cojamarca, Peru.
Distribution: Peru.

Said to resemble *Cleistocactus baumannii*, but the relationship is doubtless with the species which we have referred to *Borzicactus*. It is known to us only from description and illustrations.

Illustrations: Monatsschr. Kakteenk. **24**: 165, 167, as *Cereus plagiostoma*.

8. Borzicactus aurivillus (Schumann). (See Appendix, p. 226.)

PUBLISHED SPECIES, PERHAPS OF THIS GENUS.

CLEISTOCACTUS CHOTAENSIS Weber, Bull. Mens. Soc. Nice **44**: 47. 1904.

Cereus chotaensis Vaupel, Monatsschr. Kakteenk. **23**: 25. 1913.

Plant 2 meters high; flowers 5 cm. long, orange-colored; limb 2.5 cm. broad; scales on the ovary bearing long black hairs; stamens as long as the perianth-segments.

Type locality: On the Rio Chota, Peru.

According to Weber this species is similar to one of the so-called species of *Cereus* collected by Humboldt from this same general region.

CEREUS SERPENS (HBK.) De Candolle, Prodr. **3**: 470. 1828.

Cactus serpens Humboldt, Bonpland, and Kunth, Nov. Gen. et Sp. **6**: 68. 1823.
Cleistocactus serpens Weber in Gosselin, Bull. Mens. Soc. Nice **44**: 39. 1904.

Stems creeping; branches somewhat angled; areoles 6-angled, spiny; spines 1 to 3.5 cm. long; flowers tubular, 5 cm. long, flesh-colored; scales few, the upper ones spreading, glabrous; the lower ones hirsute; inner perianth-segments 8 to 12, lanceolate, acute, arranged in 2 or 3 series; stamens a little shorter than the perianth-segments; ovary ovate; stigma-lobes 8.

Type locality: Dry barren hills, banks of Rio Guancabamba, near Sondorillo, Ecuador, now Peru.
Distribution: Known only from the type locality.

This species was originally described from Bonpland's manuscript notes and no specimens are extant. The type locality is definitely given and it should be re-collected and positively identified. Kunth, who referred all of Humboldt and Bonpland's plants to *Cactus*, questioned its belonging to the subgenus *Cereus*, while De Candolle, although

referring it to *Cereus*, asks if it may not be an *Opuntia*. In the original description the areoles are described as 6-angled, which suggests a cylindric *Opuntia* with angled tubercles rather than areoles.

28. **CARNEGIEA** Britton and Rose, Journ. N. Y. Bot. Gard. 9: 187. 1908.

A large, columnar cactus with stout, erect, many-ribbed stems and branches, the areoles felted and spiny, the spines of flowering and sterile areoles different; flowers borne singly at the uppermost areoles, diurnal, funnelform-campanulate, the stout tube nearly cylindric, expanded above into the throat; scales on tube few, broadly ovate to oblong, acute, bearing small tufts of felt in their axils; inner perianth-segments white, short, widely spreading or somewhat reflexed when fully expanded; ovary oblong, covered with scales similar to those of the tube; stamens very numerous,* about three-fourths as long as the inner perianth-segments; stigma-lobes 12 to 18, narrowly linear, reaching a little above the stamens; fruit an oblong, ellipsoid, or somewhat obovoid berry splitting down from the top into 2 or 3 sections, containing red pulp and bearing small distinct ovate scales, its areoles spineless or bearing a few short spines; seeds small, very numerous, black and shining; embryo hooked; cotyledons incumbent; endosperm wanting.

A monotypic genus of the southwestern United States and Sonora. It is dedicated to Andrew Carnegie (1835–1919), distinguished philanthropist and patron of science.

1. **Carnegiea gigantea** (Engelmann) Britton and Rose, Journ. N. Y. Bot. Gard. 9: 188. 1908.

Cereus giganteus Engelmann in Emory, Mil. Reconn. 159. 1848.†
Pilocereus engelmannii Lemaire, Illustr. Hort. 9: Misc. 97. 1862.
Pilocereus giganteus Rümpler in Förster, Hand. Cact. ed. 2. 662. 1885.

Stem simple and upright, up to 12 meters high, or with one or two lateral branches, or sometimes with 8 to 12 branches, the branches 3 to 6.5 dm. in diameter; ribs 12 to 24, obtuse, 1 to 3 cm. high; areoles about 2.5 cm. apart or nearly contiguous on the upper part of the plant, densely brown-felted; spines of two kinds, those at the top of flowering plants acicular, yellowish brown, porrect, those of sterile plants and on the lower parts of flowering plants more or less subulate, the central ones stouter than the radials, often 7 cm. long; flowers 10 to 12 cm. long, sometimes nearly as broad as long when fully expanded; tube about 1.5 cm. long, green, its scales broad and short, white-felted in their axils; throat about 3 cm. long, covered with numerous white stamens; style stout, 5 to 6 cm. long, white or cream-colored; ovary somewhat tuberculate, bearing scales with woolly axils; ovules numerous; berry red or purple, obtuse, 6 to 9 cm. long, edible, its few, distant scales ovate, 2 to 4 mm. long, with or without 1 to 3 short acicular spines in their axils.

Type locality: Along the Gila River, Arizona.
Distribution: Arizona, southeastern California, and Sonora, Mexico.

The size of the giant cactus is usually overestimated, for it is generally stated to be from 15 to 24.4 meters high, while the tallest plants actually measured are not over 12 meters high. Dr. MacDougal reports weighing a plant which was approximately 5.5 meters high, which weighed nearly 770 kilograms. There are a number of Mexican and South American species which are taller and which would weigh more than *Carnegiea gigantea; Lemaireocereus weberi* must be many times heavier.

Although this species was not described until 1848, it seems to have been known to the early missionaries in California and Mexico (about 1540). It is referred to by Humboldt, according to Engelmann, in his work on New Spain (2: 225). According to Dr. MacDougal, the first Anglo-Saxon observation of *Carnegiea gigantea* was made by J. O. Pattee in 1825.

* Dr. Charles E. Bessey (Science n. s. 40: 680. 1914) reports that he had the stamens in one flower counted, and found that there were 3,482, while one ovary contained 1,980 ovules.

† It is usually stated that this species was published on page 158, this even being the reference given by Engelmann himself. Emory's report, in which this species was described, was printed at least twice the same year and about the same date, once as a Senate Document (Executive Document No. 7) and once as a House Document (Executive Document No. 41). In the former *Cereus giganteus* occurs on page 159 and in the latter on page 158. There has been considerable speculation and much difference of opinion as to which edition was published first, but we have recently come into possession of Emory's personal copy of the Senate Document No. 7 marked "with manuscript corrections by the author." From this copy the type of the other edition was set up.

This is sometimes called pitahaya, but it is more generally known in the Southwest by the Indian name of sahuaro or saguaro.* The ripe fruit is much used by the Indians.

While the fruit of this cactus sometimes bears short spines, we have not observed spines in the areoles of the ovary, and presume that they develop during the growth of the berry, as they are known to do in some other cacti.

FIG. 234.—Carnegiea gigantea.

Papago Saguaro, one of the United States National Monuments, is named for this plant. This monument, consisting of over 2,000 acres of desert land, is situated about 9 miles east of Phoenix, Arizona, where there is a wonderful display of *Carnegiea gigantea* on the rocky hillsides.

The sahuaro is the State flower of Arizona.

Dr. Forrest Shreve has contributed the following account of the sahuaro:

"The geographical range of the sahuaro extends from the headwaters of the Yaqui River in southern Sonora, northward to the southern edge of the Colorado Plateau. In Sonora it is rarely

*The following are some of the other published spellings of this name: suaharo, suguaro, suwarrow, suwarro, and zuwarrow.

found more than 150 miles inland from the coast of the Gulf of California, and in southern Arizona its range follows approximately the contour of 3,500 feet on the east and north, and the lower course of the Colorado River on the west. It is found in California only in three restricted localities on the Colorado River and reaches its northern limit on that stream at a point about 40 miles north of the mouth of the Bill Williams Fork.

"The occurrence of the sahuaro is by no means continuous throughout this area, for it is never found in deep alluvial soil and is relatively rare on the nearly level plains in the drainages of the Altar, Santa Cruz, and Gila rivers. It is extremely abundant on coarse detrital soils adjacent to the larger and smaller mountains and is very common wherever there is rock in place, ascending the mountains in diminishing numbers to an elevation of about 4,500 feet. The absence of the sahuaro from alluvial soils is undoubtedly related to the adverse conditions of soil aëration in these areas, and possibly to the lack of good mechanical support.

"The localities in which the sahuaro reaches its greatest size and abundance are the uppermost portions of the slopes adjacent to small mountain ranges and hills, particularly where there is a southern or southwestern exposure. In localities of this sort throughout southwestern Arizona, it reaches a height of 30 to 35 feet, which is very seldom exceeded. Individuals of this size are freely branched and often have a gross weight of as much as 6 to 8 tons. In the vicinity of Tucson branching begins on attaining a height of about 15 feet, but on the edges of the range of this cactus branching individuals are relatively uncommon and the maximum size is rarely reached.

"The flowers of the sahuaro are borne at the crown of the main trunk and the lateral branches, usually appearing in May, while the fruit matures some weeks in advance of the summer rainy season. The small seeds are borne in great profusion, but are eaten by birds and ants so rapidly that the crop is seriously decimated before the requisite conditions for germination occur. The seeds germinate readily at the high temperatures of the summer rainy season, but the growth of the seedlings is extremely slow, so that the end of the second year finds them only one-fourth of an inch in height, and at an age of 8 to 10 years they are still less than 4 inches high. The growth continues to be slow up to a height of 3 feet or more, so that individuals of that size are approximately 30 years of age. After reaching this size the growth rate is rapidly accelerated until it reaches a maximum of about 4 inches per year. The largest individuals are 150 to 200 years of age.

"The sahuaro appears to suffer from very few diseases and natural enemies, the greatest decimation in its numbers being occasioned by mechanical agencies. When struck by lightning or wounded in any other manner during the dry season, it recovers very rapidly by the formation of a heavy callus over the wounded spot. If it is wounded in the rainy season, however, bacterial decay sets in very rapidly and a large plant may be destroyed in less than a week as a result of a small wound. The nests made in them by woodpeckers are always lined by heavy callus and appear to occasion no permanent injury.

"The roots of the sahuaro are shallowly placed and widely extended, often reaching a distance of 50 to 60 feet from the base of the plant. The woody tissue may be compared to a series of bamboo fishing rods arranged parallel to each other in the form of a cylinder. These woody rods increase in thickness with the age of the plant, so that they form a very substantial framework at the base while they taper at the summit to slender elastic rods. The fleshy tissue is found both within and outside the circle of the woody rods and the water content of these two regions appears to be the same. Determinations made near the top of the plant indicate that there is 98 per cent of water on the basis of the wet weight. There are great fluctuations in the water content of the tissue from season to season and it has been shown that large quantities of water are taken up during the rainy seasons, particularly in the summer, and that this water is gradually lost during the dry seasons, particularly in May and June. The sahuaro, like many other cacti, is able by reason of its external form to adjust its size to these fluctuations in volume.

"This plant is an extremely useful one to the aborigines of its natural range. The heavy rods are used as construction material in building houses and enclosures, and the fruit and seeds are used for making both food and drink by the Papago and Pima Indians."

FIG. 235.—Fruit of Carnegiea gigantea. X0.6.

Illustrations: Amer. Bot. 20: 87; Journ. N. Y. Bot. Gard. 9: f. 32; pl. 49 to 52; Nat. Geogr. Mag. 21: 651; Safford, Ann. Rep. Smiths. Inst. 1908: f. 20; Shreve, Veg. Des. Mt. Range pl. 3 B, 4, 5 to 8; St. Nicholas 42: 366. Amer. Gard. 11: 451, 528; Ann. Rep. Bur. Amer. Ethn. 26: pl. 8, f. b; pl. 9; Bull. Torr. Club 32: pl. 3, 4; Cact. Journ. 2: 84, 130; Cact. Mex. Bound. pl. 61, 62; Curtis's Bot. Mag. 118: pl. 7222; Cycl.

The giant cactus, *Carnegeia gigantea*, near Tucson, Arizona.

Amer. Hort. Bailey 1: f. 413; Emory, Mil. Reconn. pl. opp. 72; Fl. Serr. 10: pl. 977 A; 15: pl. 1600; Gard. Chron. III. 45: f. 69; Gartenflora 31: 217; Hornaday, Camp-fires on Des. and Lava opp. 42, 68, 72, 82, 154; Lumholtz, New Trails in Mex. opp. 48; Monatsschr. Kakteenk. 10: 187; Bot. Wheeler Surv. frontispiece; Nat. Geogr. Mag. 21: 711; Orcutt, Cact. 5; Plant World 9: f. 46; 11^5: f. 2; 11^{10}: f. 2 to 4; Rümpler, Sukkulenten f. 63; Sargent, Man. Trees N. Amer. f. 558; Dict. Gard. Nicholson Suppl. f. 231; Garden 1: 263; Vegetationsbilder 4: pl. 40. B; pl. 41, 42; Garten-Zeitung 3: 58. f. 15; MacDougal, Bot. N. Amer. Des. pl. 48, 54 to 56, mostly as *Cereus giganteus;* Nat. Geogr. Mag. 27: 85, as *Cactus;* Förster, Handb. Cact. ed. 2. 663. f. 88, as *Pilocereus giganteus;* Journ. Intern. Gard. Club 3: 17.

Plate XXII shows the top of a plant, brought to the New York Botanical Garden by Dr. MacDougal in 1903, in flower June 1912; plate XXIII is from a photograph taken by Dr. MacDougal near Tucson, Arizona. Figure 234 is from a photograph also taken by Dr. MacDougal, 60 miles west of Tucson, showing a single plant; figure 235 shows the fruit collected by Dr. MacDougal, near Tucson, in 1905.

29. BINGHAMIA gen. nov.

Bushy, more or less branched cacti, the stout branches many-ribbed; ribs low, usually very spiny; flowers white, solitary at an areole, funnelform-campanulate, opening at night, of medium size, the tube straight and stout; style exserted; stamens weak and reclining on the underside of tube; scales on ovary and tube small, narrow, bearing a few hairs in their axils but no spines; fruit turgid, juicy, globular, crowned by the withering-persistent flower; seeds black, small.

We recognize 2 species in this genus, inhabitants of western Peru; it is dedicated to Hiram Bingham, Director of the Yale University Expedition to Peru, 1914–1915. The type species is *Cephalocereus melanostele* Vaupel.

Key to Species.

Upper areoles of the flowering plant long-bristly, bearing spines.....1. *B. melanostele*
Upper areoles bearing acicular spines similar to those of the lower.....2. *B. acrantha*

1. Binghamia melanostele (Vaupel).

Cephalocereus melanostele Vaupel, Bot. Jahrb. Engler 50: Beibl. 111: 12. 1913.

Much branched at base, the 10 to 12 branches strict, usually only 1 meter high; ribs 18 to 22 (perhaps sometimes more), low, close together; areoles approximate, circular, bearing short white and yellow spines; spines very numerous, diverse, those on sterile branches stiff and pungent, the

Fig. 236.—Binghamia melanostele.

Fig. 237.—Binghamia acrantha.

central and longer ones sometimes 3 cm. long, those on old and flowering branches numerous, when young brownish, in age nearly white, all weak, bristle-like, 3 to 8 cm. long, hardly pungent; flowers 4 to 5 cm. long, white; scales on ovary and tube minute, numerous, bearing tufts of white wool in their axils; immature fruit sometimes longer than broad; mature fruit either globular or a little depressed, red, said to be edible, bearing scattered minute areoles with small tufts of wool; pulp white; seeds numerous, black.

Type locality: Near Chosica, Peru, at 800 meters altitude.

Distribution: Mountains of western Peru.

The top of the flowering plant is made up of a compact mass of long white or yellowish bristle-like spines from one side of which the flowers appear, and this F. Vaupel has termed a lateral cephalium.

Plate XXIV, figure 3, shows the top of a sterile plant brought by Dr. Rose from the type locality in 1914. Figure 236 is from a photograph taken by Dr. Rose at Santa Clara, Peru, in 1914; figure 238 shows the fruit of the plant photographed at Santa Clara.

FIG. 238.—Fruit of B. melanostele. ×0.6.

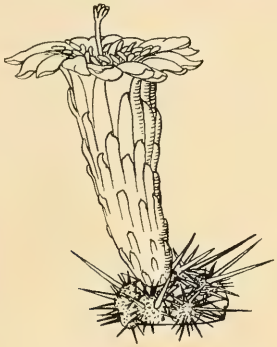


FIG. 239.—Flower of Binghamia acrantha. ×0.7.

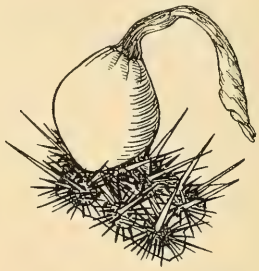


FIG. 240.—Fruit of Binghamia acrantha. ×0.7.

2. Binghamia acrantha (Vaupel).

Cereus acranthus Vaupel, Bot. Jahrb. Engler **50**: Beibl. **111**: 14. 1913.

Stems 1 to 3 meters high, much branched at base, the branches usually erect, 5 to 8 cm. thick; ribs 12 to 14, low, somewhat tuberculate above, but on older parts with mere constrictions; areoles large, approximate, felted and spiny; felt at first yellow, then brown, finally black; spines at first yellow, numerous, short, and spreading, except the 1 or 2 centrals, which are stouter, 3 to 4 cm. long, porrect or reflexed; flowers opening in the early evening; flower 6 to 7 cm. long, gradually tapering upward from base, about 2.5 cm. in diameter at the top; scales on ovary and flower-tube small, acute, with small tufts of wool in their axils; upper scales and outer perianth-segments mauve; limb 4 to 5 cm. broad when fully expanded; inner perianth-segments usually white, sometimes greenish, oblong, obtuse, 2 to 2.5 cm. long; style cream-colored, much exserted; stigma-lobes greenish; fruit red, its pulp white, edible, slightly acid.

Type locality: Santa Clara, east of Lima, Peru.

Distribution: Very common on the hills above Lima, from Santa Clara to Matucana.

This is one of the most common species in central Peru, being especially abundant on the hillsides and in the narrow valleys between the hills, but not extending down into the broad valleys. It often forms dense thickets. In the lower parts of its range, where the fogs are abundant, especially about Santa Clara, the branches are often covered with lichens and tillandsias.

Our specimens of flowers were obtained by bringing in fully developed buds and allowing them to open; these began to open about 6 o'clock in the evening and were fully expanded at 9.

M. E. Eaton del.

1. Top of flowering branch of *Harrisia fernowii*.
2. Flowering branch of *Harrisia bomplandii*.
3. Top of branch of *Binghamia melanostele*.
(Natural size.)

The name *Pilocereus acranthus* was proposed by Schumann (see plate 5 B of Engler and Drude, Veg. Erde 12: 1911), but was never published.

Illustration: Engler and Drude, Veg. Erde 12: pl. 5 B, as *Pilocereus acranthus.*

Figure 237 is from a photograph taken by Dr. Rose at the type locality in 1914; figure 239 shows the flower, and figure 240 the fruit of the plants photographed.

30. **RATHBUNIA** Britton and Rose, Contr. U. S. Nat. Herb. 12: 414. 1909.

Rather slender cacti, simple or bushy, the stems and branches weak, erect or bent; ribs few, 4 to 8, prominent; spines subulate, those of the flowering areoles not differing from the others; flowers diurnal, scarlet, solitary, usually at the upper areoles, narrowly tubular, the tube bearing distant long scales and united with it except at the tip, elongated, at first straight, or in age somewhat curved, the limb more or less oblique; perianth-segments short, spreading or reflexed; filaments exserted; style slender, exserted beyond the tube; stigma-lobes narrow; ovary with small scales bearing short felt and sometimes spines in their axils; fruit capped by the withered flower, spiny or becoming smooth, globular; seeds of the typical species black, compressed, minutely pitted, with a large basal oblique hilum.

This genus commemorates Dr. Richard Rathbun (1852–1918), Assistant Secretary of the Smithsonian Institution in charge of the United States National Museum, a well-known authority on marine invertebrates.

Type species: *Cereus sonorensis* Rünge.

We here include 2 species, natives of western Mexico.

KEY TO SPECIES.

Ribs 5 to 8; flowers 4 to 10 cm. long ..... 1. *R. alamosensis*
Ribs 4; flowers 12 cm. long ..... 2. *R. kerberi*

1. **Rathbunia alamosensis** (Coulter) Britton and Rose, Contr. U. S. Nat. Herb. 12: 415. 1909.

Cereus alamosensis Coulter, Contr. U. S. Nat. Herb. 3: 406. 1896.
Cereus sonorensis Rünge in Schumann, Monatsschr. Kakteenk. 11: 135. 1901.
Rathbunia sonorensis Britton and Rose, Contr. U. S. Nat. Herb. 12: 415. 1909.
Cereus pseudosonorensis Gürke, Monatsschr. Kakteenk. 20: 147. 1910.

Columnar, 2 to 3 meters high, at first erect but generally finally bent or curved, 8 cm. thick or less, rooting at or near the tip and thus forming new plants; ribs 5 to 8, obtuse; radial spines about 11 to 18, spreading, straight, whitish; centrals 1 to 4, much stouter than the radials, 3 to 5 cm. long, porrect or ascending; flowers scarlet, 4 to 10 cm. long; scales on ovary small, acute or obtuse, with a small tuft of felt and a few bristle-like spines in the axils, those on the flower-tube with a tuft of felt and sometimes with a spine; tube-proper 1.5 cm. long; style nearly white; stigma-lobes 6, cream-colored; ovary tuberculate; fruit red, globular, 3 to 4 cm. in diameter, naked or bearing scattered clusters of 5 or 6 white acicular spines.

Type locality: Near Alamos, Sonora, Mexico.

Distribution: Southern Sonora, Sinaloa, and Tepic, Mexico.

The plant grows in large clusters sometimes 8 meters in diameter; its flowers are various in size, and the perianth-limb is apparently quite variable in the degree of obliquity. In Mexico the plant is called cina.

Cereus simonii Hildmann (Monatsschr. Kakteenk. 5: 43. 1895), an unpublished name, according to Schumann and Gürke, belongs here. Schumann at one time described this plant as *Cereus stellatus*, a very different plant from southern Mexico which we have described elsewhere as *Lemaireocereus stellatus* (see page 92, *ante*).

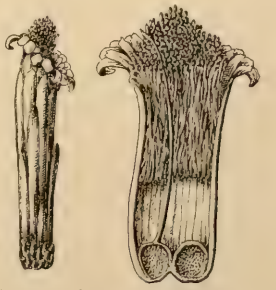


FIG. 241.—Flower of Rathbunia alamosensis. ×0.7.
FIG. 242.—Flower of same, cut open. ×0.7.

Illustrations: Blühende Kakteen 3: pl. 122; Monatsschr. Kakteenk. 11: 135; Rep. Mo. Bot. Gard. 16: pl. 3, f. 5, all as *Cereus sonorensis;* Schumann, Gesamtb. Kakteen Nachtr. f. 4, as *Cereus stellatus.*

Plate XXV, figure 1, shows the top of a plant received from the Missouri Botanical Garden in 1904, which flowered in the New York Botanical Garden, June 23, 1915; figure 2 shows a flowering piece of a plant sent to the New York Botanical Garden from Guaymas, Mexico, by Dr. Rose in 1910. Figures 241 and 242 show flowers of a plant collected by Dr. MacDougal at Torres, Sonora, in 1902.

2. Rathbunia kerberi (Schumann) Britton and Rose, Contr. U. S. Nat. Herb. **12**: 415. 1909.

Cereus kerberi Schumann, Gesamtb. Kakteen 89. 1897.
Cleistocactus kerberi Gosselin, Bull. Mens. Soc. Nice **44**: 33. 1904.

Columnar, somewhat branched, 2 meters high; ribs 4, compressed; radial spines about 16, subulate; central spines 4, stouter than the radials, 4.5 cm. long; flowers 12 cm. long; outer perianth-segments linear-lanceolate, rose-colored, reflexed; stamens exserted; scales on the ovary lanate in the axils.

Type locality: On Volcano of Colima, Mexico.

Distribution: Known only from the type locality.

Dr. Rose saw flowers of this plant in the herbarium of the Botanical Garden at Berlin in 1912 and noted that it was a *Rathbunia;* otherwise it is known to us only from description. In transferring it to *Rathbunia* (*loc. cit.*) we associated specimens with it from Sinaloa and Tepic, Mexico, which now appear better referable to *Rathbunia alamosensis*, although the flowers are longer than in typical specimens (8 to 10 cm. long) and somewhat curved.

31. ARROJADOA gen. nov.

Stems low, much branched, cylindric; roots fibrous; ribs numerous, low, straight; areoles close together, bearing small acicular spines; flowers diurnal, borne in a pseudocephalium at the top of stem or branch, small, red or pink, resembling in color and size that of a large *Cactus* (*Melocactus*), nearly cylindric, the tube short; perianth-segments in several rows, short, erect; stamens and style included; fruit a small, oblong, naked, juicy berry; seeds small, black.

This is a peculiar genus, with no very close allies. The original reference of its two species to *Cereus* is not warranted by any taxonomic considerations, for the structure, origin, and shape of the flowers and fruit are quite different. In size and form the flower is similar to *Lophocereus*, but here the resemblance ends. Its terminal pseudocephalium is most characteristic, for instead of remaining as a permanent crown of the plant it forms a lateral collar for the new joint which is projected through its center.

The name is in honor of Dr. Miguel Arrojado Lisboa, the present superintendent of Estrada de Ferro Central de Brazil, to whom Brazil is indebted for the extensive botanical exploration of the semiarid regions made a few years ago.

The genus contains 2 species, of which *Cereus rhodanthus* is selected as the type.

Key to Species.

Branches short and thick, 2 to 4 cm. in diameter ..... 1. *A. rhodantha*
Branches long and slender, 1 to 1.5 cm. in diameter ..... 2. *A. penicillata*

1. Arrojadoa rhodantha (Gürke).

Cereus rhodanthus Gürke, Monatsschr. Kakteenk. **18**: 69. 1908.

Low, 1 to 2 meters long, at first erect, afterwards branching and clambering; joints short, cylindric, 2 to 4 cm. in diameter; ribs 10 to 13, low; areoles small, approximate, usually less than 1 cm. apart; spines at first brown, in age white, the central ones similar to the radials except a little longer, when young accompanied by some long cobwebby hairs; bristles at the tops of the joints long, brown; flowers solitary at the upper areoles, forming in clusters of 12 to 14 at the tops of branches, pink, rigid, 3 to 4 cm. long; ovary and lower part of tube naked; uppermost scales and perianth-segments similar, obtuse; stamens numerous, included; fruit red, oblong to obovate, about 2 cm. long.

Type locality: Caatinga de São Raimundo, Piauhy, Brazil.

1. Flowering branches of *Rathbunia alamosensis*.
2. Flowering branches of *Rathbunia alamosensis*.
3. Top of flowering branch of *Borzicactus acanthurus*.
4. Top of stem of *Arrojadoa rhodantha*.

(All natural size.)

Distribution: Arid parts of Bahia and Piauhy, Brazil.

Plate XXV, figure 4, shows the flowering top of a plant obtained by Dr. Rose near Joazeiro, Brazil, in 1915, which flowered soon afterward in the New York Botanical Garden; plate XXVII, figure 1, shows a fruiting branch of a plant collected by Dr. Rose near Salgada, Bahia, in 1915.

2. **Arrojadoa penicillata** (Gürke).

Cereus penicillatus Gürke, Monatsschr. Kakteenk. **18**: 70. 1908.

Plant slender, 1 to 2 meters high, much branched, often bushy, the branches 1 to 1.5 cm. in diameter; ribs usually 10, low; areoles small, close together; spines several; radial spines short, spreading; central spines longer, often 2 to 3 cm. long; pseudocephalium at the top of the joint 2 to 3 cm. in diameter, made up of long brown bristles and white wool; flowers 6 to 20 in a cluster, dark pink, 3 cm. long; fruit small, a little longer than broad, 1.5 cm. long, smooth, without scales, purplish, juicy; seeds numerous, black.

Type locality: Calderão, Bahia, Brazil.
Distribution: State of Bahia, Brazil.

Figure 243 is from a photograph taken by Paul G. Russell at Machado Portella, Bahia, in 1915.

FIG. 243.—Arrojadoa penicillata.

32. **OREOCEREUS** (Berger) Riccobono, Boll. R. Ort. Bot. Palermo **8**: 258. 1909.

Plants forming large clusters, usually low, erect, ascending or even prostrate, without a cephalium, but the areoles developing long white hairs, especially toward the tips of old branches, the stout stems and branches strongly ribbed; ribs strongly armed with spines; flowers slender, elongated, somewhat curved, diurnal; tube nearly cylindric, slightly expanded upward, the limb short, spreading, somewhat oblique, the inner perianth-segments dark red, narrow; filaments numerous, slender, exserted, attached all over the throat; anthers narrow, red; style long, exserted, with short green stigma-lobes; ovary and flower-tube bearing small narrow scales, with long black and white hairs in their axils; fruit globular, spineless, dry, dehiscing (like *Echinocactus*) by a basal opening; seeds numerous, dull black, with a large truncated hilum.

The name is from the Greek, signifying mountain-cereus. The genus is monotypic, in so far as known to us. The following species inhabits the Andes:

1. **Oreocereus celsianus** (Lemaire) Riccobono, Boll. R. Ort. Palermo **8**: 259. 1909.

Pilocereus celsianus Lemaire in Salm-Dyck, Cact. Hort. Dyck. 1849. 185. 1850.
Pilocereus fossulatus Labouret, Rev. Hort. IV. **4**: 24. 1855.
Pilocereus bruennowii Haage in Förster, Handb. Cact. ed. 2. 651. 1885.
Pilocereus fossulatus gracilis Rümpler in Förster, Handb. Cact. ed. 2. 661. 1885.
Pilocereus fossulatus pilosior Rümpler in Förster, Handb. Cact. ed. 2. 661. 1885.
?*Pilocereus kanzleri* Haage in Förster, Handb. Cact. ed. 2. 671. 1885.
Pilocereus celsianus lanuginosior Salm-Dyck in Schumann, Gesamtb. Kakteen 180. 1897.
Pilocereus celsianus gracilior Schumann, Gesamtb. Kakteen 180. 1897.
Pilocereus celsianus williamsii Schumann, Gesamtb. Kakteen 180. 1897.
Pilocereus celsianus bruennowii Schumann, Gesamtb. Kakteen 180. 1897.
Cleistocactus celsianus Weber in Gosselin, Bull. Mens. Soc. Nice **44**: 44. 1904.
Cereus celsianus Berger, Rep. Mo. Bot. Gard. **16**: 64. 1905.
?*Pilocereus straussii* Heese, Gartenflora **56**: 410. 1907.
?*Cereus straussii* Vaupel, Monatsschr. Kakteenk. **23**: 37. 1913.
Oreocereus celsianus bruennowii Britton and Rose, Stand. Cycl. Hort. Bailey **4**: 2404. 1916.

A bushy cactus, about 1 meter high, the slender branches either prostrate or ascending below, erect above, about 8 cm. thick; ribs about 10, obtuse, 1 cm. high, more or less broken up into tubercles; areoles bearing long hairs and several stout yellow spines sometimes over 5 cm. long; flowers borne near the tops of the stems, slender, 7 to 9 cm. long; limb 2 to 3 cm. broad; scales of the perianth-tube narrowly lanceolate, long-acuminate, 5 to 6 mm. long, much shorter than the hairs; inner perianth-segments linear to linear-oblong, acutish, the outer obtuse; fruit about 3 cm. in diameter, essentially smooth when mature, the basal pore about 5 mm. in diameter.

Type locality: Mountains of Bolivia.

Distribution: Bolivia, southern Peru, and northern Chile.

Pilocereus celsianus fossulatus Labouret (Förster, Handb. Cact. ed. 2. 660. 1885) was given by Rümpler as a synonym of *P. fossulatus*. *Pilocereus foveolatus* Labouret (Rev. Hort. **1862**: 428. 1862) was given by Lemaire as a synonym of *P. celsianus*. *Pilocereus williamsii* Lemaire (Rev. Hort. **1862**: 428. 1862), only a name, is usually referred here.

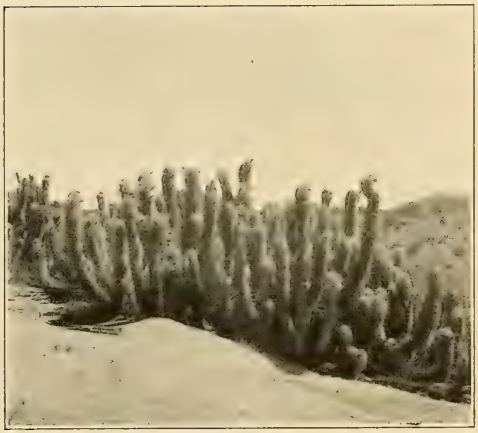


Fig. 244.—Oreocereus celsianus.

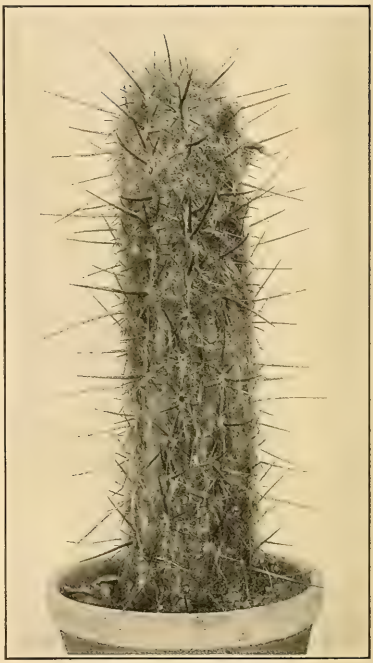


Fig. 245.—Oreocereus celsianus.

Illustrations: De Laet, Cat. Gen. f. 50, No.7; Knippel, Kakteen pl. 28; Wiener, Ill. Gart. Zeit. **29**: f. 22, No. 7, all as *Pilocereus celsianus;* Cact. Journ. **2**: 5; Gard. Chron. **1873**: f. 197, both as *Pilocereus fossulatus;* Dict. Gard. Nicholson **3**: f. 151; Förster, Handb. Cact. ed. 2. f. 86, both as *Pilocereus bruennowii;* Monatsschr. Kakteenk. **14**: 169, as *Pilocereus celsianus bruennowii;* Rep. Mo. Bot. Gard. **16**: pl. 2, as *Cereus celsianus;* Gartenflora **56**: f. 49, as *Pilocereus straussii;* Monatsschr. Kakteenk. **24**: 131, as *Pilocereus celsianus lanuginosior.*

Figure 244 is from a photograph taken by Dr. Rose above Arequipa, Peru, in 1914; figure 245 is from a photograph of a joint; figure 246 shows the flower, and figure 247 the immature fruit of the plant photographed.

Fig. 246.—Flower of Oreocereus celsianus. ×0.7.

Fig. 247.—Fruit of same. ×0.7.

PUBLISHED SPECIES, PERHAPS NEAR OREOCEREUS CELSIANUS.

CEREUS MONVILLEANUS Weber in Schumann, Gesamtb. Kakteen 67. 1897.

Cleistocactus monvilleanus Weber in Gosselin, Bull. Mens. Soc. Nice 44: 45. 1904.

Columnar, branching; ribs 19, obtuse, somewhat sinuate; radial spines about 20, setaceous or acicular.

Distribution: Uncertain. Perhaps Peru, Bolivia, or Ecuador.

According to Weingart, this species is near *Cereus aurivillus* and, if so, it is a *Borzicactus*. So far as we are aware, its flowers are unknown. We have never seen specimens of it.

33. FACHEIROA gen. nov.

Trunk short, with numerous slender, erect or ascending branches; ribs numerous, spiny; flowers borne in a pseudocephalium, this densely brown or red-felted; flowers small, the ovary and flower-tube covered with long silky brown or red hairs; tube-proper short, smooth within; throat short, not hairy at base, bearing numerous short, included stamens; inner perianth-segments short, white; fruit small, globular, greenish, and gelatinous within; seeds black, tuberculate, with a large basal hilum.

Dr. Zehntner states that the habit of this plant is like *Cereus squamosus*, but that the plants differ in the manner of producing their flowers. The flowers, although about the same size, show that the two species are generically different. The generic name is from the common Brazilian one used for a number of the cacti, this one being called facheiro preto da Serra de Cannabrava. Only one species is known.

1. Facheiroa publiflora sp. nov.

Erect, 1.5 to 5 meters high, much branched; trunk short, 10 to 12 cm. in diameter; branches slender, elongated, 5 to 7 cm. in diameter, at first light green, in age grayish green; ribs about 15, low, 5 to 6 mm. high; areoles 1 cm. apart, brown-felted; spines brownish, all acicular; radial spines 10 to 12; central spines 3 or 4, somewhat longer than the radials, often 2 to 2.5 cm. long; pseudocephalium extending from the top downward for 2 dm. or more, 2 to 4 cm. broad, composed of a dense mass of short brown or red hairs; flowers 3 to 3.5 cm. long; tube-proper about 1 cm. long, smooth within; inner perianth-segments orbicular, 3 to 4 mm. in diameter; style slender, glabrous; scales on ovary and flower-tube small, 2 to 6 mm. long, greenish, glabrous, obscured by the long hairs from the axils of other scales; fruit about 2 cm. in diameter, hairy; seeds 1.5 mm. long.

Collected by Leo Zehntner on the Serra de Cannabrava (Chique-Chique district) Bahia, Brazil, October 1917.

34. CLEISTOCACTUS Lemaire, Illustr. Hort. 8: Misc. 35. 1861.

Slender, erect or clambering cacti, with numerous low ribs and approximate areoles; flowers slender, tubular, the perianth withering-persistent on the fruit; perianth-segments small, erect, red to green; stamens and style exserted; ovary and flower-tube with numerous appressed scales bearing long hairs or wool in their axils; fruit small, globular, highly colored, becoming naked; pulp white; seeds black, slightly punctate.

Type species: *Cereus baumannii* Lemaire.

Berger recognizes only 1 species, but mentions 3 of *Cereus* (*C. hyalacanthus*, *C. laniceps*, and *C. parviflorus*) which may belong here, while Roland-Gosselin recognizes 14 species. 16 species have been described in the genus. We recognize 3 species. The name is from the Greek, signifying closed-cactus, referring to the unexpanded limb of the flower.

KEY TO SPECIES.

Flowers red or green.
- Flower-tube bent; inner perianth-segments red ..... 1. *C. baumannii*
- Flower-tube straight; inner perianth-segments green ..... 2. *C. smaragdiflorus*

Flowers orange-yellow ..... 3. *C. anguinus*

1. **Cleistocactus baumannii** Lemaire, Illustr. Hort. **8**: Misc. 35. 1861.

Cereus baumannii Lemaire, Hort. Univ. **5**: 126. 1844.
Cereus colubrinus Otto in Förster, Handb. Cact. 409. 1846.
Cereus tweediei Hooker in Curtis's Bot. Mag. **76**: pl. 4498. 1850.
Aporocactus baumannii Lemaire, Illustr. Hort. **7**: Misc. 68. 1860.
Aporocactus colubrinus Lemaire, Illustr. Hort. **7**: Misc. 68. 1860.
Cleistocactus colubrinus Lemaire, Illustr. Hort. **8**: Misc. 35. 1861.
Cereus baumannii colubrinus Schumann, Gesamtb. Kakteen 133. 1897.
Cereus baumannii flavispinus Schumann, Gesamtb. Kakteen 133. 1897.
Cleistocactus baumannii colubrinus Riccobono, Boll. R. Ort. Bot. Palermo **8**: 266. 1909.
Cleistocactus baumannii flavispinus Riccobono, Boll. R. Ort. Bot. Palermo **8**: 266. 1909.

Somewhat branching at base, 2 meters high or more, 2.5 to 3.5 cm. in diameter, dark green; ribs 12 to 16, low; areoles approximate, brown or black-felted; spines acicular, 15 to 20, white, yellow, or brown, 4 cm. long or less; flower orange to scarlet, 5 to 7 cm. long, narrow, 1 cm. in diameter, curved, with oblique limb; scales on ovary and flower-tube ovate, acute; perianth-segments short and broad, acute; stamens numerous, shortly exserted, appressed against the upper part of the flower-tube; fruit 1 to 1.5 cm. in diameter, red with white pulp.

Type locality: Not cited.

Distribution: Argentina; reported also from Paraguay and Uruguay.

Cereus subtortuosus Hortus (Förster, Handb. Cact. 409. 1846) was given as a synonym of *Cereus colubrinus*. *Cereus colubrinus flavispinus* Salm-Dyck (Cact. Hort. Dyck. 1844. 32. 1845) seems never to have been described though Schumann takes it up under *C. baumannii* and attributes it to Salm-Dyck. Förster in his Handbuch refers it as a synonym of *C. colubrinus*.

According to Weingart, *C. grossei* (Monatsschr. Kakteenk. **18**: 8. 1908) is only a variety of this species, while *C. anguiniformis* (Monatsschr. Kakteenk. **18**: 6. 1908) is true *C. baumannii*.

Illustrations: Blühende Kakteen **1**: pl. 57; Monatsschr. Kakteenk. **13**: 139; Rep. Mo. Bot. Gard. **16**: pl. 9, f. 2 to 5; pl. 12, f. 2, all as *Cereus baumannii;* Curtis's Bot. Mag. **76**: pl. 4498; Fl. Serr. **6**: pl. 559; Loudon, Encycl. Pl. ed. 3. f. 19394, all as *Cereus tweediei*.

Plate XXVII, figure 2, shows a flowering top of a plant in the New York Botanical Garden.

2. **Cleistocactus smaragdiflorus** (Weber).

Cereus smaragdiflorus Weber, Dict. Hort. Bois 281. 1894.
Cereus baumannii smaragdiflorus Weber in Schumann, Gesamtb. Kakteen 134. 1897.

Stems slender, 2 to 2.5 cm. in diameter; ribs low, 12 to 14; radial spines numerous, acicular; central spines porrect, several, stouter, the longer ones 2 cm. long, yellowish to dark brown; flowers small, 4 to 5 cm. long, straight, a little constricted above the ovary, the tube and ovary red; upper scales on flower-tube and outer perianth-segments with a long mucro; perianth-segments small, green, acute to mucronate; filaments included; style slightly exserted; stigma-lobes 5 to 8; fruit globose, 1.5 cm. in diameter; seeds small, black.

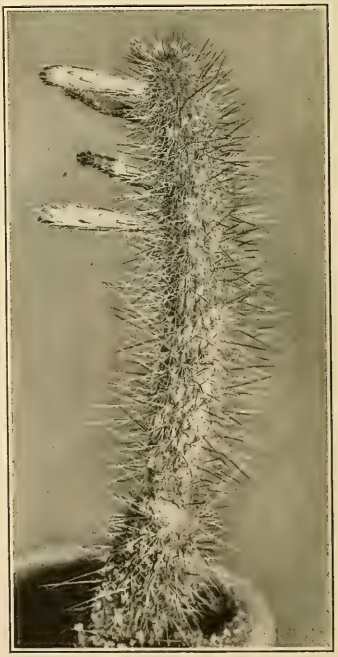


FIG. 248.—Cleistocactus smaragdiflorus.

Type locality: Not cited.

Distribution: Provinces of Jujuy, Salta, Catamarca, and La Rioja, Argentina.

We have known little of this species until quite recently. In 1917 Dr. Shafer collected on a dry sandy bank at Caliligua, Jujuy, a plant (No. 69) which was sent to the New York Botanical Garden, where it flowered while this volume was going through the press.

The flowers are so different from the typical species that there is some doubt in our minds whether it is a true *Cleistocactus*.

Through the kindness of Dr. Juan A. Dominguez, director of the Museo Farma Cologico at Buenos Aires, Dr. Rose was permitted to bring to the United States certain critical specimens for detail study. Among these plants were flowers of a *Cleistocactus*, straight and regular but much larger than those of *C. smaragdiflorus*. Unfortunately, only flowers were preserved. These may be described as follows: flowers 6 to 7 cm. long, straight; outer perianth-segments apiculate; inner perianth-segments oblong, obtuse or rounded; stamens and style exserted. The plant was collected by Fritz Claren in Jujuy, Department of Santa Catalina, altitude 3,400 to 4,300 meters, in 1901 (No. 11576). It is probably an undescribed species, but it deserves further study.

The name *Cereus colubrinus smaragdiflorus* Weber (Dict. Hort. Bois 281. 1894), without formal publication, is implied, but the name was not actually used until later (Monatsschr. Kakteenk. 15: 122. 1905).

Illustrations: Blühende Kakteen 2: pl. 87; Monatsschr. Kakteenk. 15: 123, both as *Cereus smaragdiflorus*.

Figure 248 is from a photograph of an Argentine specimen communicated by Dr. Spegazzini as typical.

3. **Cleistocactus anguinus** (Gürke).

Cereus anguinus Gürke, Monatsschr. Kakteenk. 17: 166. 1907.

Branches decumbent; ribs 10 or 11, low; radial spines 18 to 22, grayish but brownish at base and apex, slender; central spines 1 or 2, stouter than the radials, yellowish; flowers somewhat one-sided, tubular, 7 cm. long, orange-yellow, 7.5 cm. long; stamens exserted.

Type locality: Paraguay.

Distribution: Paraguay.

We have studied a small plant in the collection of the New York Botanical Garden received from the Berlin Botanical Garden in 1914; vegetatively this resembles *Cleistocactus baumannii*. We also refer here a plant collected by J. A. Shafer at Paraguavi, Paragnay, March 21, 22, 1917 (No. 144).

PUBLISHED SPECIES, KNOWN TO US ONLY FROM DESCRIPTION.

CLEISTOCACTUS LANICEPS (Schumann) Gosselin, Bull. Mens. Soc. Nice 44: 32. 1904.

Cereus laniceps Schumann, Gesamtb. Kakteen 93. 1897.

Upright, 4 meters high or less; branches 5 cm. thick; ribs 9, blunt; areoles large, 6 mm. in diameter or more; spines usually 3 at an areole in a vertical row, subulate, gray, about 1.5 cm. long; flowers from a single rib, 3.5 cm. long; ovary spherical, 5 mm. long, covered with subulate scales, these bearing copious brown wool in their axils; fruit red, woolly, 1 cm. in diameter. It was collected near Tunari, Bolivia, at 1,300 meters altitude.

CLEISTOCACTUS PARVISETUS (Otto) Weber in Gosselin, Bull. Mens. Soc. Nice 44: 46. 1904.

Cereus parvisetus Otto in Pfeiffer, Enum. Cact. 79. 1837.

Originally described from a Brazilian specimen grown at Berlin, as follows: Simple, slender, 12 to 15 mm. in diameter, erect, with 12 angles; ribs somewhat compressed; areoles close together, white; upper spines 4 or 5, brown; lower spines 6 to 8, white, hair-like.

According to Schumann this species is found in the Serra da Lapa, Minas Geraes, Brazil. We do not know its relationship, although Weber thought it was a *Cleistocactus*. It was introduced only once, probably by Riedel, and is not now in cultivation.

This comes from the same region as the species of *Leocereus* and should be compared with plants of that genus.

CLEISTOCACTUS HYALACANTHUS (Schumann) Gosselin, Bull. Mens. Soc. Nice 44: 33. 1904.

Cereus hyalacanthus Schumann, Gesamtb. Kakteen 101. 1897.

This is described as upright, less than 1 meter high; ribs 20, low, obtuse; areoles elliptic; spines in clusters of 25 or more, the longest 2 cm. long, acicular, white, puberulent; flowers somewhat curved, 3 to 3.5 cm. long; ovary covered with numerous scales bearing copious brown wool in their axils.

It is known only from specimens collected by Otto Kuntze in the Province of Jujuy, Argentina.

CLEISTOCACTUS PARVIFLORUS (Schumann) Gosselin, Bull. Mens. Soc. Nice 44: 32. 1904.

Cereus parviflorus Schumann, Gesamtb. Kakteen 100. 1897.

Described as columnar, 2 to 3 meters high; branches 3 cm. in diameter; ribs 12, deeply marked by transverse furrows; radial spines 5 to 7, the longest one 4 mm. long, subulate, dark yellow; flowers from only a single rib, one above another, 2.5 to 3 cm. long; ovary covered with short, oblong to triangular scales bearing in their axils felt; fruit yellow, 1 cm. in diameter.

Collected near Parotani, Bolivia, by Otto Kuntze.

35. ZEHNTNERELLA gen. nov.

Tall and slender, much branched at base; ribs numerous, very spiny; flowers scattered along the upper part of the stem, 1 from an areole, perhaps night-blooming, very small; tube short but definite, about the length of the throat; base of throat filled with a ring of long white hairs; inner perianth-segments minute, white; ovary and flower-tube covered with small scales, their axils filled with hairs; fruit small, globular; seeds minute, tuberculately roughened, brownish to blackish, with a large basal slightly depressed hilum.

Named for Dr. Leo Zehntner, formerly of the Horto Florestal, Joazeiro, Brazil, who has furnished us specimens and valuable information concerning many of the cacti from this region. It is a great pleasure to name a genus for this very keen observer, who has done such valuable work in Brazil, often under very trying circumstances. It is based upon a plant which Dr. Rose collected with him on the hills east of Joazeiro, Bahia, June 4, 1915 (No. 19760). Our plant may be the same as *Cereus squamosus* Gürke (Monatsschr. Kakteenk. 18:70. 1908). A photograph of this species was reproduced (Bot. Jahrb. Engler 40: Beibl. 93: pl. 10) and this resembles *Zehntnerella squamulosa*, but the detailed description of *Cereus squamosus* does not wholly agree with it, and we have been unable to examine the type specimen of *Cereus squamosus*.

FIG. 249.—Zehntnerella squamulosa.

1. **Zehntnerella squamulosa** sp. nov.

Trunk, when present, 15 to 20 cm. in diameter, but usually a cluster of branches arising from the base; branches usually strict, 4 meters long or more, 5 to 7 cm. in diameter, covered with a mass of spines; ribs 17 to 20, low, close together; areoles circular, small; spines 10 to 15, acicular, chestnut-brown, the longest ones 3 cm. long; flowers small, 3 cm. long; inner perianth-segments oblong, 4 mm. long; lower scales on the ovary ovate, apiculate, 1 to 4 mm. long, the upper ones becoming oblong, all glabrous, the hairs in the axils white; fruit about 2 cm. in diameter, crowned by the withered perianth; seeds 1 mm. long.

Fig 250.—Flower of Z. squamulosa. Natural size.

This plant was common in a restricted rocky out-crop east of Joazeiro, called the Serra do Atoleiro, where flowers and photographs were obtained by Dr. Rose, June 4, 1915 (No. 19760, type) and ripe fruit was collected at the same locality by Dr. Zehntner in October 1917.

This species is called facheiro preto in Bahia.

Figure 249 is from a photograph taken by Paul G. Russell in Bahia, Brazil, in 1915; figure 250 shows a flower of the plant photographed.

36. **LOPHOCEREUS** (Berger) Britton and Rose, Contr. U. S. Nat. Herb. **12**: 426. 1909.

Columnar, stout cacti, the stems simple or with few branches, or much branched at base; ribs few; areoles on lower part of stem very different from the upper ones; flowering areoles large, felted, developing long bristles standing out at right angles to the axils of the stem; flowers usually several at each areole, small, funnelform, with short narrow tubes, nocturnal, beginning to open at about six o'clock at night and by eight or nine fully expanded, but closed the following morning, odorless; outer perianth-segments greenish; inner perianth-segments pink; stamens short, included; fruit small, red, globular, when mature bursting irregularly, glabrous or with a few spines and some felt in axils of lower scales; seeds numerous, small, black, shining, with a depressed basal hilum.

Type species: *Cereus schottii* Engelmann.

Three species have been recognized in this genus, all from the same floral region, which we now regard as reducible to one.

The generic name is from the Greek, signifying crested-cereus, with reference to the bristly top of the flowering stem.

1. **Lophocereus schottii** (Engelmann) Britton and Rose, Contr. U. S. Nat. Herb. **12**: 427. 1909.

Cereus schottii Engelmann, Proc. Amer. Acad. **3**: 288. 1856.
Pilocereus schottii Lemaire, Rev. Hort. **1862**: 428. 1862.
Cereus sargentianus Orcutt, Gard. and For. **4**: 436. 1891.
Pilocereus sargentianus Orcutt in Schumann, Monatsschr. Kakteenk. **2**: 76. 1892.
Cereus palmeri Engelmann in Coulter, Contr. U. S. Nat. Herb. **3**: 401. 1896.
Cereus schottii australis K. Brandegee, Zoe **5**: 3. 1900.
Lophocereus australis Britton and Rose, Contr. U. S. Nat. Herb. **12**: 427. 1909.
Lophocereus sargentianus Britton and Rose, Contr. U. S. Nat. Herb. **12**: 427. 1909.

Usually branching only at base, forming large clumps sometimes with as many as 50 or even 100 upright or ascending stems, 1 to 7 meters high; ribs usually 5 to 7, but sometimes 9, separated by broad intervals; bristles of the flowering areoles numerous, straight, finely acicular, gray, 6 cm. long or less; flowerless areoles smaller, little felted, with 3 to 7 short subulate spreading radial spines swollen at base and 1 or 2 central ones a little longer and stouter; flowers 3 to 4 cm. long; style, stigma-lobes, and filaments whitish; fruit 2 to 3 cm. in diameter, usually naked, rarely spiny; seeds 2.5 mm. long.

Type locality: In Sonora, toward Magdalena, Mexico.

Distribution: Southern Arizona, Sonora, and Lower California.

As with many other columnar cacti, this is sometimes used for fences. It is usually called sinita, with various spellings.

This species is remarkable among cacti on account of the long bristle-like spines, which develop at the ends of the flowering branches, giving the plant the appearance of bearing terminal brushes. This modification of the spines from the flowering areoles is similar to

the changes we see in certain other genera such as *Cephalocereus*, *Arrojadoa*, and to a less extent in *Carnegiea*, on account of which both this species and *Carnegiea gigantea* have been referred by some authors to the genus *Pilocereus*.

Lophocereus schottii inhabits parts of western Mexico and southern Arizona, which have great aridity, but it usually grows in colonies and in this way seems to withstand the rigor of the desert. Its range is more extensive than that of most cacti and it shows considerable variability. Three species of *Lophocereus* have been described, but appear to be merely geographical races of this one.

Illustrations: MacDougal, Bot. N. Amer. Des. pl. 8; Cact. Mex. Bound. pl. 74, f. 16, as *Cereus schottii;* Schumann, Gesamtb. Kakteen f. 37, 38, as *Pilocereus schottii;* Orcutt, Gard. and For. 4: f. 69, as *C. sargentianus;* Monatsschr. Kakteenk. 5: 86, as *P. sargentianus*.

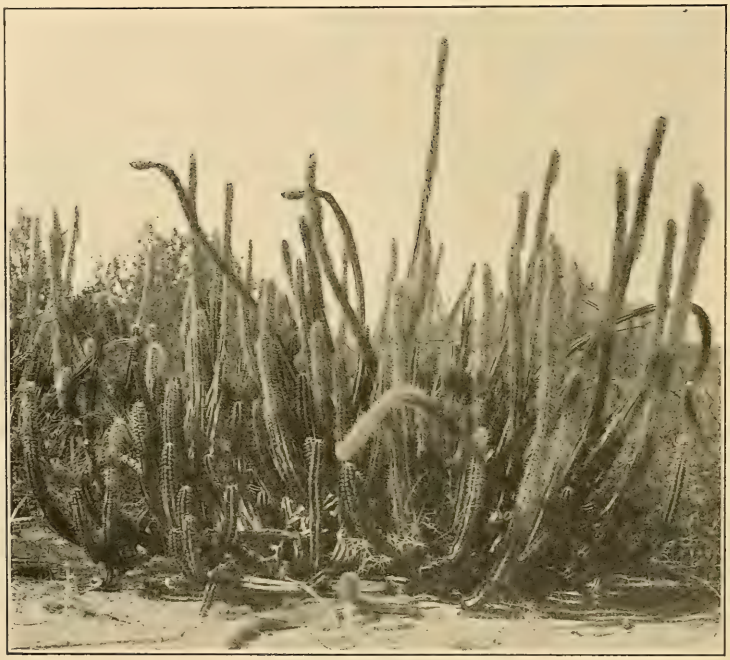


FIG. 251.—Lophocereus schottii.

Figure 251 is from a photograph obtained by Edward Palmer near Guaymas, Sonora; figure 252 shows a section through the upper part of a flowering stem collected by Dr. Rose at Abreojos Point, Lower California, in 1911; figure 253 shows a flower of a plant brought by Dr. MacDougal from Arizona to the New York Botanical Garden in 1902.

37. **MYRTILLOCACTUS** Console, Boll. R. Ort. Bot. Palermo 1: 8. 1897.

Large cacti, usually with short trunks and large, much branched tops, the stout, few-ribbed branches nearly erect, all the areoles bearing the same kind of spines; flowers diurnal, very small, several, sometimes as many as 9 at an areole, with very short tubes and widely spreading perianth-segments; ovary bearing a few minute scales with tufts of wool in their axils, spineless; fruit small, globular, edible; seed very small, black, with basal hilum.

Type species: *Cereus geometrizans* Martius.

This genus has no very close allies. We have grouped it with *Lophocereus* and the following genus, because they likewise have more than 1 flower from an areole, but otherwise little else in common. The small flowers somewhat resemble orange flowers, having scarcely any tubes; the short stamens are almost entirely exserted. The fruits are small berries.

We know 4 closely related species, natives of Mexico and Guatemala. The name is from the Greek, signifying berry-cactus, referring to the small fruit.

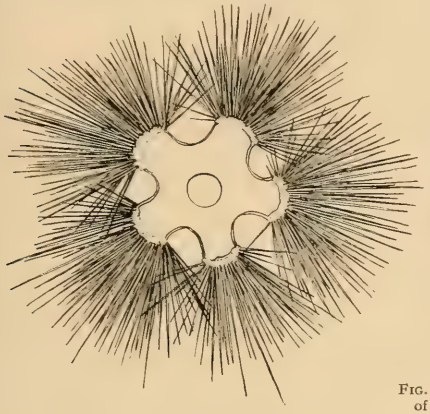


FIG. 252.—Cross-Section of stem of Lophocereus schottii. ×0.5.

FIG. 253.—Flower of Lophocereus schottii. Natural size.

FIG. 254.—Section of rib of Myrtillocactus geometrizans with fruit at the areoles. ×0.8.

FIG. 255.—Flower of same. ×0.8.

KEY TO SPECIES.

Young branches very blue; central spine elongated, reflexed, dagger-like ..... 1. *M. geometrizans*
Young branches green; central spine not dagger-like.
  Spines usually 3 to 5, ascending, with no definite central spine or, when present, very short.. 2. *M. cochal*
  Spines 6 or more, with definite central spine.
    Radial spines 5; fruit oblong, 10 to 15 mm. long ..... 3. *M. schenckii*
    Radial spines more than 5; fruit globular, 6 mm. in diameter ..... 4. *M. eichlamii*

1. Myrtillocactus geometrizans (Martius) Console, Boll. R. Ort. Bot. Palermo **1**: 10. 1897.

Cereus geometrizans Martius in Pfeiffer, Enum. Cact. 90. 1837.
Cereus pugioniferus Lemaire, Cact. Aliq. Nov. 30. 1838.
Cereus gladiator Otto and Dietrich, Allg. Gartenz. **6**: 34. 1838.
Cereus geometrizans pugioniferus Salm-Dyck, Cact. Hort. Dyck. 1849. 48. 1850.
Cereus geometrizans quadrangularispinus Lemaire in Labouret, Monogr. Cact. 367. 1853.

Tree-like, with a short definite trunk crowned by a large, much branched top; branches often a little curved, bluish green, usually 5 or 6-ribbed, 6 to 10 cm. in diameter, very blue when young; ribs 2 to 3 cm. high, rounded; areoles 2 to 3 cm. apart; radial and central spines very different, almost filling the areoles; radial spines usually 5, rarely 8 or 9, usually short, 2 to 10 mm. long, but sometimes 3 cm. long, more or less turned backward, a little flattened radially but swollen at base; central spine elongated, dagger-shaped, flattened laterally, 1 to 7 cm. long and sometimes 6 mm. broad; flowers appearing from the upper part of the areole, 2.5 to 3.5 cm. broad, the limb 3 to 4 times as long as the tube; perianth-segments oblong, 1.5 cm. long; stamens numerous, erect, exserted; fruit ellipsoid to subglobose, edible, purplish or bluish, 1 to 2 cm. long.

Type locality: Mexico.

Distribution: San Luis Potosí to Oaxaca, Mexico.

This cactus is very common on the Mexican tableland. The fruits, known as garrambullas, are to be found in all the Mexican markets, and are eaten both fresh and dried; the dried fruits very much resemble raisins in appearance and are used in much the same way.

The name *Cereus pugioniferus quadrangulispinus* Lemaire is given by Förster (Handb. Cact. 395. 1846) as a synonym for *C. pugioniferus; Cereus geometrizans quadrangulispinus* Lemaire is given only by name by Salm-Dyck (Cact. Hort. Dyck. 1849. 48. 1850); Labouret (Monogr. Cact. 366. 1853) gives *Cereus gladiator geometrizans* Monville (Cat. 1846) as a synonym for *C. geometrizans pugioniferus* Salm-Dyck; *Cereus arrigens* Monville and *C. gladiger* Lemaire are both given by Labouret (Monogr. Cact. 367. 1853) as synonyms for the variety *Cereus geometrizans quadrangularispinus* Lemaire.

Cereus aquicaulensis (Pfeiffer, Enum. Cact. 90. 1837) is not published, but is given only as a synonym of this species. *Cereus quadrangulispinus* Lemaire (Linnaea 19: 363. 1846) is only a name.

Cereus garambello Haage in Förster (Handb. Cact. 433. 1846), unpublished, belongs here.

Illustrations: Boll. R. Ort. Bot. Palermo 1: f. 1 to 4; Contr. U. S. Nat. Herb. 12: pl. 72; Safford, Ann. Rep. Smiths. Inst. 1908: pl. 9, f. 2; pl. 11, f. 1. Ber. Deutsch. Bot. Ges. 15: pl. 2, f. 1; Schumann, Gesamtb. Kakteen f. 23, these last two as *Cereus geometrizans*.

Plate XXVI, figure 1, is from a photograph taken by Dr. MacDougal near Tehuacán, Mexico, in 1908. Figure 254 shows a section of a rib and the small fruits of a plant collected by Edward Palmer at San Luis Potosí in 1905 and figure 255 shows its flower.

2. **Myrtillocactus cochal** (Orcutt) Britton and Rose, Contr. U. S. Nat. Herb. 12: 427. 1909.

Cereus cochal Orcutt, West Amer. Sci. 6: 29. 1889.
Cereus geometrizans cochal K. Brandegee, Zoe 5: 4. 1900.

Plant 1 to 3 meters high, much branched; trunk short, woody, sometimes 3 dm. in diameter; ribs 6 to 8, obtuse, separated by shallow intervals; spines grayish to black; radial spines 5, short; central spines when present 2 cm. long; flowers open night and day, 2.5 cm. long and fully as broad; perianth-segments usually 16, light green, the outer ones tinged with purple, oblong; filaments white; stigma-lobes 5 or 6, white; fruit edible, slightly acid, globular, 12 to 18 mm. in diameter, red.

Type locality: Todos Santos Bay, Lower California.

Distribution: Lower California.

This species is called cochal by the Indians of Lower California, who use the stems for firewood and are said to eat the fruit.

Illustration: Monatsschr. Kakteenk. 5: 74, as *Cereus cochal.*

3. **Myrtillocactus schenckii** (J. A. Purpus) Britton and Rose, Contr. U. S. Nat. Herb. 12: 427. 1909.

Cereus schenckii J. A. Purpus, Monatsschr. Kakteenk. 19: 38. 1909.

Tree-like, 3 to 5 meters high, with a very stout trunk and many short ascending branches, dark green; areoles circular, crowded with black felt, about 5 mm. apart; radial spines 6 to 8, straight, 5 to 12 mm. long, black or brownish; central spine 1, usually 2 cm. long, sometimes 5 cm. long; fruits small, oblong, 10 to 15 mm. long, naked; seeds black, pitted.

Type locality: Sierra de Mixteca, Puebla, Mexico.

Distribution: Puebla and Oaxaca, Mexico.

In habit and fruit this species is very similar to the well-known *Cereus geometrizans*, but differs from it greatly in color of stem and in the areoles and spines.

Illustrations: Monatsschr. Kakteenk. 19: 39, as *Cereus schenckii;* Contr. U. S. Nat. Herb. 12: pl. 73.

Plate XXVI, figure 2, shows a photograph taken by Dr. D. T. MacDougal between Mitla and Oaxaca City in 1906.

4. **Myrtillocactus eichlamii** sp. nov.

Branches strongly 6-angled, deep green or slightly glaucous; ribs obtuse; areoles 2 cm. apart, large, circular, with grayish wool at time of flowering; radial spines 5, bulbose at base; central spine 1, a little longer than the radials; flower-buds dark purple; outer perianth-segments greenish with red tips; inner perianth-segments creamy white, about 10, spreading almost at right angles to the tube; stamens numerous, pale, somewhat spreading; style white, a little longer than the stamens; flowers fully open at half past nine o'clock in the morning, deliciously fragrant; fruit small, globular, 6 mm. in diameter, wine-colored, naked except a few small scales.

1

2

1. *Myrtillocactus geometrizans*, Tehuacán, Mexico.
2. *Myrtillocactus schenckii*, near Mitla, Mexico.

This species is described from a plant sent by the late Federico Eichlam, in 1909, from Guatemala, which flowered in Washington, April 1910. It differs from *Myrtillocactus geometrizans* in its larger, greener branches and different armament.

Figure 256 shows a flower and two fruits of the type plant.

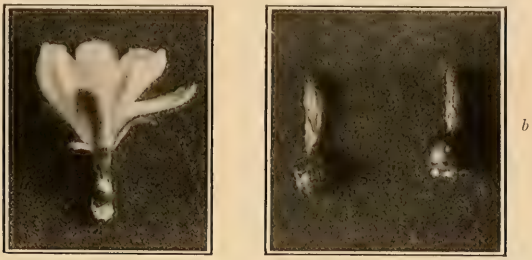


FIG. 256.—Myrtillocactus eichlamii. Flower and fruits. Natural size.

38. NEORAIMONDIA gen. nov.

A very stout cactus, the stems branched at base; branches erect, columnar, few-ribbed, the ribs separated by broad intervals, very spiny; areoles brown-felted, enormously developed, thick, the flowering ones sometimes elongated and branched, forming cephalium-like masses, these spineless but with ridges of short brown felt; flowers 2 on the areoles or solitary, funnelform, the tube stout, longer than the limb; perianth-segments oblong; scales of the ovary and flower-tube with short brown wool in their axils; fruit ellipsoid to globular, covered with globular areoles with short brown wool and short spines; seed dull black with pitted surface and a depressed hilum.

A monotypic genus of western Peru. It is named in honor of Antonio Raimondi (1825–1890), the great geographer and naturalist of Peru.

Berger says of the plant, which he referred to the subgenus *Eulychnia* (Rep. Mo. Bot. Gard. **16**: 68. 1905):

FIG. 257.—Neoraimondia macrostibas.

FIG. 258.—Flower and enlarged areole of N. macrostibas. ×0.7.

"But I am quite aware that in this form the subgenus *Eulychnia* is more artificial than natural. For instance, *C. macrostibas* A. Berger differs greatly from the rest, especially by its enlarged and prolonged flowering areoles. But the material at hand is so scanty that I must refrain from any further statement." "*Cereus macrostibas* A. Berger was originally described by Schumann as a *Pilocereus*, and as such it is another heterogeneous form of this conglomerate genus."

1. Neoraimondia macrostibas (Schumann).

Pilocereus macrostibas Schumann, Monatsschr. Kakteenk. **13**: 168. 1903.
Cereus macrostibas Berger, Rep. Mo. Bot. Gard. **16**: 69. 1905.

Plant with many branches arising from near the base, 2 to 4 meters high; areoles 1 to 2 cm. apart, very large, rarely less than 1 cm. broad, often globular or on old plants elongating into subcylindric spur-like bodies 10 cm. long or less; spines 12 or more at an areole, very unequal, the central ones often elongated on the old part of the stem, sometimes 24 cm. long; flowers 2.5 to 4 cm. long; inner perianth-segments about 1 cm. long; filaments numerous, short, included, white; style short, white; stigma-lobes pinkish; fruit sometimes 7 cm. in diameter, purple, the brown-woolly areoles finally falling off as little balls; pulp red, edible; seeds numerous.

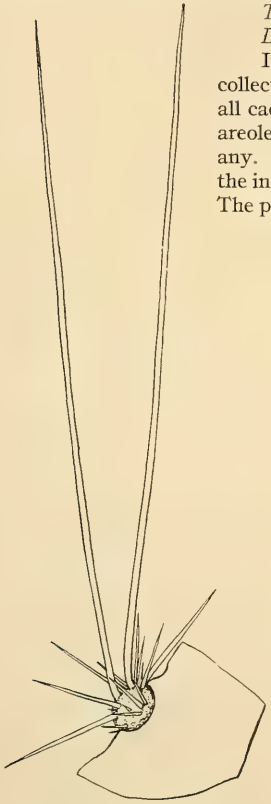


FIG. 259.—Cluster of spines of Neoraimondia macrostibas. ×0.6.

Type locality: Near Mollendo, Peru.

Distribution: Throughout western Peru.

In 1914, Dr. Rose studied the plant in its native habitat and collected complete specimens. It is one of the most remarkable of all cacti in its very stout, few-ribbed branches, immense brown areoles and greatly elongated spines, these, perhaps, the longest of any. These areoles doubtless produce flowers year after year and the indication is that the largest of these areoles must be of great age. The plant itself must grow very slowly, for it is found only on the

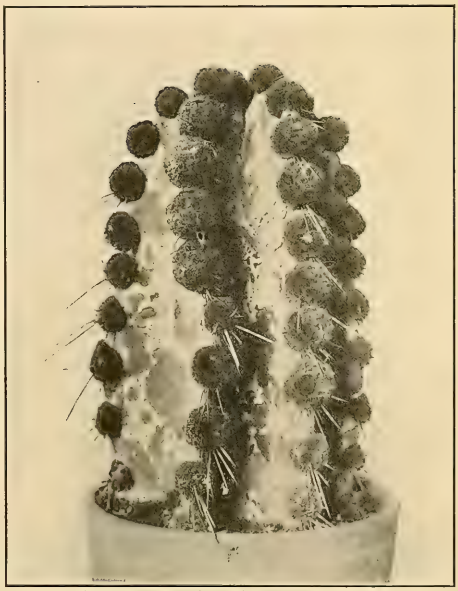


FIG. 260.—Neoraimondia macrostibas.

borders of the barren Peruvian deserts, where its water supply is very meager. The elongated spines (24 cm. long) are the longest we have seen in any cacti, although *Cereus jamacaru* is reported to have spines 30 cm. long, but the longest we have measured were only 19 cm. long.

The unusual specific name given to this plant probably refers to the peculiar areoles.

Illustrations: Monatsschr. Kakteenk. **13**: 168, 169, both as *Pilocereus macrostibas*.

Figure 257 is from a photograph taken by C. H. T. Townsend near Chosica, Peru; figure 258 shows a flower and young fruit on the much enlarged areole, collected by Dr. Rose near Arequipa in 1914; figure 259 shows a cluster of spines obtained by Dr. Rose at Chosica, Peru; figure 260 is from a photograph of a top of the Chosica plant brought by Dr. Rose to the New York Botanical Garden.

Subtribe 2. HYLOCEREANAE.

Elongated, vine-like, climbing, trailing or pendent, branched cacti, the stems and branches angled, ribbed, fluted, or rarely flat, the joints emitting aërial roots, the areoles usually spiny; flowers mostly large and white, rarely red or pink; perianth-limb regular, or in *Aporocactus* more or less oblique; fruit a fleshy berry, often large.

We group the species known to us in 9 genera.

Key to Genera.

A. Joints angled, ribbed, winged, or fluted.
  Ovary and fruit covered with large foliaceous scales, their axils neither spiny, hairy, nor bristly; flowers mostly large, nocturnal; stems and branches 3-angled or 3-winged.
    Perianth-tube elongated; flowers very large, their scales naked in the axils. . . . . 1. *Hylocereus* (p. 183)
    Perianth-tube scarcely any; flowers small, some of their scales with tufts of short hairs and occasional bristles in the axils. . . . . 2. *Wilmattea* (p. 195)
  Ovary and fruit not bearing large foliaceous scales, their axils spiny, hairy, or bristly.
    Flowers elongate-funnelform, very large, mostly nocturnal, the tube and ovary usually bearing scales, hairs, or spines.
      Stems ribbed, fluted, or angled. . . . . 3. *Selenicereus* (p. 196)
      Stems winged.
        Areoles of ovary and flower-tube bearing felt and spines subtended by short scales; flowers nocturnal. . . . . 4. *Mediocactus* (p. 210)
        Areoles of ovary and flower-tube bearing long hairs; flowers diurnal. . . . . 5. *Deamia* (p. 212)
    Flowers short-funnelform or funnelform-campanulate.
      Perianth-limb regular, the tube stout; flowers white.
        Tube of the flower bearing short foliaceous scales; areoles of the tuberculate ovary bearing long hairs. . . . . 6. *Weberocereus* (p. 214)
        Areoles of flower-tube and of non-tuberculate ovary bearing short black spines. . . . . 7. *Werckleocereus* (p. 216)
      Perianth-limb somewhat oblique, the tube slender; flowers pink. . . . . 8. *Aporocactus* (p. 217)
AA. Joints flat. . . . . 9. *Strophocactus* (p. 221)

1. HYLOCEREUS (Berger) Britton and Rose, Contr. U. S. Nat. Herb. **12**: 428. 1909.

Climbing cacti, often epiphytic, with elongated stems normally 3-angled or 3-winged, and branches emitting aërial roots, the areoles bearing a tuft of felt and several short spines, or spineless in one species; areoles on seedlings and juvenile growths often bearing bristles; flowers very large, nocturnal, funnelform, the limb as broad as long, and as long as the tube or longer; ovary and tube bearing large foliaceous scales but no spines, felt, wool, or hairs; outer perianth-segments similar to the scales on the tube, but longer; petaloid perianth-segments narrow, acute or acuminate, mostly white, rarely red; stamens very many, in two series, equaling or shorter than the style; style cylindric, rather stout and thick, the linear stigma-lobes numerous, simple or branched; fruit spineless but with several or many persistent foliaceous scales mostly large and edible; seeds small, black; cotyledons large, flattened above, thick, ovate, acute, connate at base.

We know 18 species, natives of the West Indies, Mexico, Central America, and northern South America. Most of them are closely related, having similar stems, flowers, and fruits.

Type species: *Cactus triangularis* Linnaeus.

The name is from the Greek, meaning forest-cereus.

Key to Species.

A. Areoles spiniferous; ribs not deeply crenate.
  B. Stems bluish or more or less whitened or gray.
    Margin of joints horny.
      Spines short, conic.
        Outer perianth-segments acuminate, as long as the inner, white ones. . . . 1. *H. guatemalensis*
        Outer perianth-segments acute, much shorter than inner, golden-tipped ones. 2. *H. purpusii*
      Spines acicular, slender.
        Outer perianth-segments linear-lanceolate, acuminate. . . . . 3. *H. ocamponis*
        Outer perianth-segments oblong-lanceolate, obtuse. . . . . 4. *H. bronxensis*
    Margin of joints not horny; spines few, conic.
      Branches slender, 4 cm. thick or less, scarcely crenate.
        Stigma-lobes entire. . . . . 5. *H. polyrhizus*
        Stigma-lobes bifid. . . . . 5a. *H. venezuelensis*
      Branches stout, 5 to 10 cm. thick. . . . . 6. *H. costaricensis*

Key to Species—continued.

A. Areoles spiniferous; ribs not deeply crenate—*continued.*
BB. Stems bright green.
Margin of stems horny.
Ribs of stem broad, thin, crenate..... 7. *H. undatus*
Ribs of stem thick, scarcely crenate..... 8. *H. cubensis*
Margin of stems not horny.
Stigma-lobes branched or forked.
Spines several; margins of stem nearly straight; stigma-lobes branched.. 9. *H. lemairei*
Spine one; margins of stem undulate; stigma-lobes forked (at least sometimes)..... 10. *H. monacanthus*
Stigma-lobes (so far as known) entire.
Perianth-segments red or reddish purple.
Ribs thin, almost wing-like; perianth-segments linear..... 11. *H. stenopterus*
Joints angular, not winged; inner perianth-segments oblanceolate... 12. *H. extensus*
Inner perianth-segments white.
Scales on the ovary few and scattered..... 13. *H. napoleonis*
Scales on the ovary brown, large, imbricated.
Joint-angles strongly tubercled..... 14. *H. trigonus*
Joint-angles scarcely tubercled or not at all.
Joints somewhat crenate..... 15. *H. triangularis*
Joints not crenate..... 16. *H. antiguensis*
AA. Areoles without spines; ribs very deeply crenate..... 17. *H. calcaratus*

1. Hylocereus guatemalensis (Eichlam).

Cereus trigonus guatemalensis Eichlam, Monatsschr. Kakteenk. **21**: 68. 1911.

Stems high-climbing, 3 to 5 meters long, stout, mostly 3-angled, 2 to 7 cm. broad, the basal parts often narrow or nearly terete; joints beautifully glaucous or in time becoming more or less greenish; ribs low-undulate, the margins horny, not at all glaucous; areoles 2 cm. apart or less; spines 2 to 4, 2 to 3 mm. long, conic, dark, but on seedlings numerous and bristle-like; flowers 3 dm. long; outer perianth-segments rose-colored, acuminate; inner perianth-segments lanceolate, acute, white; style yellow, 7 mm. in diameter; stigma-lobes 25, entire; fruit 6 to 7 cm. in diameter, covered with large scales; seeds black.

Type locality: Guatemala.

Distribution: Guatemala.

We have grown plants from seeds; the seedlings are erect, 4-angled, the spines numerous, the bristles white, the cotyledons 15 mm. long.

Illustration: Monatsschr. Kakteenk. **23**: 155, as *Cereus trigonus guatemalensis.*

Figure 261 shows a joint of a plant sent to the New York Botanical Garden from Fiscal, Guatemala, by C. C. Deam.

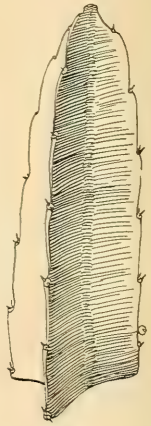


Fig. 261.—Joint of H. guatemalensis. ×0.5.

2. Hylocereus purpusii (Weingart).

Cereus purpusii Weingart, Monatsschr. Kakteenk. **19**: 150. 1909.

Stems bluish, climbing, elongate, epiphytic; ribs 3 or 4, with horny margins only slightly undulate; areoles small; spines 3 to 6, short; flowers large, 25 cm. long and nearly as broad when fully expanded; outer perianth-segments narrow, purplish; middle perianth-segments golden; inner perianth-segments broad, white except at the golden tips.

Type locality: Near Tuxpan, Mexico.

Distribution: Lowlands of western Mexico.

We have grown this plant but have not seen the flowers, our description of them being founded on that of Mr. Weingart.

Illustrations: Monatsschr. Kakteenk. **22**: 26, 27, both as *Cereus purpusii.*

3. Hylocereus ocamponis (Salm-Dyck) Britton and Rose, Contr. U. S. Nat. Herb. **12**: 429. 1909.

Cereus ocamponis Salm-Dyck, Cact. Hort. Dyck. 1849. 220. 1850.

Stems strongly 3-angled, at first bright green, soon glaucous, dull bluish green in age; ribs rather deeply undulate, their margins with a horny, brown border; areoles 2 to 4 cm. apart, borne near the

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1. End of fruiting branch of *Arrojadoa rhodantha*.
2. Top of plant of *Cleistocactus baumannii*.
3. Flower on branch of *Hylocereus stenopterus*.

(All natural size.)

bottom of each undulation; spines 5 to 8, acicular, 5 to 12 mm. long; flowers 25 to 30 cm. long and fully as broad; outer perianth-segments narrow, long-acuminate, greenish, spreading or reflexed; inner perianth-segments oblong, acuminate, white; style stout; stigma-lobes linear, entire, green; ovary covered with imbricated, ovate, acute, purplish-margined scales.

Type locality: Mexico or Colombia.

Distribution: Mexico?

The above flower description is drawn from New York Botanical Garden specimens which bloomed in 1912 (No. 6170). The species is known to us from cultivated plants only.

Mr. Weingart is strongly of the opinion that *Cereus napoleonis* Graham is the same as this species and, if so, this name should be used. He states that *C. napoleonis* was described from an old plant, while the other species was described from young plants, which, he thinks, would account for the differences in the descriptions. We believe, however, that the two species are distinct and that *C. napoleonis* is much nearer *H. triangularis*.

Illustration: Monatsschr. Kakteenk. 23: 29, as *Cereus ocamponis*.

Plate XXVIII shows a flowering joint of a plant in the collection of the New York Botanical Garden.

A species related to *H. ocamponis* but probably distinct was collected by T. S. Brandegee on rocks of Cerro Colorado, Sinaloa, Mexico, November 1904. Mr. Brandegee states that it is also epiphytic on trees. Rose, Standley, and Russell collected the same species at Villa Union, near Mazatlan, in 1910, but, although we have had it in our collections ever since, it has not yet flowered.

4. **Hylocereus bronxensis** sp. nov.

Joints strongly 3-angled, dull grayish green, 3 to 4 cm. broad; ribs strongly undulate, the margins horny and brown; areoles 2 to 3 cm. apart; spines about 10, acicular, brown in age, about 6 mm. long; flowers 25 cm. long; outer perianth-segments broad, ovate, obtuse or rounded; inner perianth-segments oblong, rounded at apex, more or less apiculate, but not long-acuminate; scales on the ovary broad; stigma-lobes (perhaps) bifid.

Described from specimens which flowered in the New York Botanical Garden (No. 9722) June 28, 1912. The plant was obtained from G. E. Barre in 1902, but its origin is otherwise unknown. It is related to *Hylocereus ocamponis* but its flowers are quite different from those of that species.

5. **Hylocereus polyrhizus** (Weber).

Cereus polyrhizus Weber in Schumann, Gesamtb. Kakteen 151. 1897.

Slender vines, sometimes only 3 to 4 cm. thick, normally 3-angled, at first green or purplish, but soon becoming white and afterwards green again; ribs or wings comparatively thin although in age becoming more turgid; margin nearly straight, obtuse, not horny; spines 2 to 4, rather stout, brownish, 2 to 4 mm. long, sometimes accompanied by two white hairs or bristles which finally drop off; young flower-buds globular, purple; flowers 2.5 to 3 dm. long or longer, strongly fragrant; outer perianth-segments linear-lanceolate, more or less reddish, especially at the tips; inner perianth-segments nearly white; stigma-lobes rather short, yellowish, entire; ovary covered with approximate ovate scales, with red or deep purple margins; fruit scarlet, oblong, 10 cm. long.

Type locality: Colombia.

Distribution: Colombia and Panama.

The original description of *Cereus polyrhizus* was, apparently, based on the juvenile state of the species for the branches are described as 5-angled; Weingart (Monatsschr. Kakteenk. 22: 106) associates the plant with the group in which we place it, and plants sent to the New York Botanical Garden in 1901 by M. Simon of St. Ouen, Paris, who had in his collection many cacti described by Weber, are, apparently, the same as others since obtained from Panama and Colombia; perhaps also from Ecuador.

We have referred here the 3 specimens collected by Dr. Rose in Ecuador although we are not sure that these are even conspecific. They all grow in very diverse habitats; only one was seen in flower. No. 22116 was found growing closely appressed to the trunk of a tree to which it was so tightly attached that it was with difficulty that specimens were obtained. The locality was on the edge of the mangrove swamp near Guayaquil. In the same region were seen other plants, presumably of the same species but these were clambering from tree to tree high up in their tops and far out of reach. No. 23342 was in a very peculiar habitat for a *Hylocereus*. It came from the edge of the Catamayo Valley, a hot semiarid region. Its stems were very stout, almost woody, and were spread out all over the top of a small tree. No flowers or fruit were seen and only a single plant was observed. The branches were nearly 10 cm. broad and the brown spines were usually 4 in a cluster and nearly 1 cm. long. On the other hand No. 23396 was found in a habitat very suitable for a *Hylocereus;* this was in a tree along a stream east of Portovelo in southern Ecuador; the plant was in flower but almost out of reach so that it was with difficulty we obtained a single flower. The following brief notes are based on our field observations:

Stems 3-angled, whitish; flowers 31 cm. long, fragrant; outermost segments short, purple; outer scales oblong, orange-red; inner perianth-segments white, tinged with pink; stamens yellow; scales on the ovary oblong, acute, dull green, with purple margins.

5a. Hylocereus venezuelensis sp. nov. (See Appendix, p. 226.)

6. Hylocereus costaricensis (Weber) Britton and Rose, Contr. U. S. Nat. Herb. **12:** 428. 1909.

Cereus trigonus costaricensis Weber, Bull. Mus. Hist. Nat. Paris **8:** 457. 1902.

Vigorous vines, perhaps the stoutest of the genus, sometimes 10 cm. broad, normally 3-angled, at first green or purplish, but soon becoming white and afterwards green or gray; ribs or wings comparatively thin although in age becoming more turgid; margin rather variable, either straight or somewhat undulate, obtuse, never horny; spines 2 to 4, short, rather stout, brownish, usually accompanied by two white hairs or bristles which finally drop off; young flower-buds globular, purple; flowers 3 dm. long or more, strongly fragrant; outer perianth-segments narrow, more or less reddish, especially the tips; inner perianth-segments pure white; stigma-lobes rather short, yellowish, entire; ovary covered with closely set scales, these having deep purple margins; fruit scarlet, oblong, 10 cm. long.

FIG. 262.—Ovary of Hylocereus costaricensis transformed into branch. ×0.94.

Type locality: Costa Rica.
Distribution: Costa Rica.

This species was originally described as a variety of *Cereus trigonus*, but it has much stouter blue stems and is otherwise different. It grows well in cultivation and frequently flowers. The very young areoles on the stem produce an abundance of nectar which runs down the stem in large sticky drops.
reduced leaves from the lower areoles.

Figure 262 represents an arrested flower transformed into a branch showing scales or

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Flower and end of branch of *Hylocereus ocamponis*. × 0.7.

7. **Hylocereus undatus** (Haworth) Britton and Rose in Britton, Flora Bermuda 256. 1918.

Cactus triangularis aphyllus Jacquin, Stirp. Amer. 152. 1763.
Cereus triangularis major De Candolle, Prodr. 3: 468. 1828.
Cereus undatus Haworth, Phil. Mag. 7: 110. 1830.
Cereus tricostatus Gosselin, Bull. Soc. Bot. France 54: 664. 1907.
Hylocereus tricostatus Britton and Rose, Contr. U. S. Nat. Herb. 12: 429. 1909.

Stem long, clambering over bushes and trees or creeping up the sides of walls; ribs mostly 3, broad, thin, green; margin usually strongly undulate, more or less horny in age; areoles 3 to 4 cm. apart; spines 1 to 3, small, 2 to 4 mm. long; flowers up to 29 cm. long or more; outer perianth-segments yellowish green, all turned back, some strongly reflexed; inner perianth-segments pure white, erect, broad, oblanceolate, entire, with apiculate tips; filaments slender, cream-colored; stigma-lobes as many as 24, slender, entire, cream-colored; style stout, 7 to 8 mm. in diameter, cream-colored; fruit oblong, 10 to 12 cm. in diameter, red, covered with large foliaceous scales, or nearly smooth when mature, edible; seeds black.

Type locality: China, evidently in cultivation.

Distribution: Common throughout the tropics and subtropics; often found as an escape and widely cultivated.

This species has long been known in cultivation under the name of *Cereus triangularis*, and it is to be regretted that the name *triangularis* can not be retained, but the plant which Linnaeus described as *Cactus triangularis* came from Jamaica. The latter is now well known to botanists but it has never been much cultivated, while *H. undatus* is grown all over the world and grows half-wild in all tropical countries. It is the best known of all the night-blooming cereuses and has one of the largest flowers. It makes a beautiful hedge plant; in Honolulu there is a hedge about Punahou College which is half a mile long and is said to produce 5,000 flowers in a single night.

Fig. 263.—Hylocereus undatus.

Cereus undatus was described by Haworth from plants sent from China; he says it is similar to *C. triangularis*, but twice as large. Pfeiffer afterwards made it his variety *major* of *C. triangularis*, which Schumann referred doubtfully to *C. napoleonis*.

In the New York Botanical Garden herbarium are specimens of a *Hylocereus* collected on Martinique in 1884 by Père Duss (No. 904), which have the horny-margined ribs and large white flowers of this species. From this island Jacquin in 1763 described a variety *aphyllus* of *Cactus triangularis* from the mountain forests, which may very likely be this species, in which case Martinique may be the home of this widely cultivated plant.

Two forms of this species are common in Yucatan. One is called chacoub; it has white flowers except that the perianth-segments have purple edges and tips; the fruit is globular and reddish purple. The other form called zacoub has white flowers and oblong and creamy-white fruit; these fruits are considered among the most desirable in Yucatan and are often to be found in the markets for sale.

Illustrations: Safford, Ann. Rep. Smiths. Inst. 1908: pl. 6, f. 1, as *Hyloçereus tricostatus;* Martius, Fl. Bras. 4^2: pl. 42; Engler and Prantl, Pflanzenfam. 3^{6a}: f. 57, A, B;

Edwards's Bot. Reg. **21**: pl. 1807; Gard. Mag. **55**: 689, all as *Cereus triangularis;* Curtis's Bot. Mag. **44**: pl. 1884; Loudon, Encycl. Pl. f. 6870, as *Cactus triangularis;* Ann. Rep. Smiths. Inst. **1917**: pl. 10; Scientific Monthly **5**: 287, as night-blooming cereus; Britton, Flora Bermuda f. 278.

Plate XXX shows a flowering joint of a plant brought by Dr. Small from southern Florida to the New York Botanical Garden in 1903, where it has since bloomed every year;

FIG. 264.—Hylocereus undatus.

plate XXXII, figure 1, shows a fruiting joint of a plant in the same collection brought from Tehuacán, Mexico, by Dr. MacDougal and Dr. Rose in 1906. Figure 263 is from a photograph taken by Paul G. Russell at Machado Portella, Bahia, Brazil, in 1915; figure 264 is from a photograph by A. S. Hitchcock, 1918, showing a hedge of night-blooming cereus on a wall at Punahou College, Honolulu; the picture was taken early in the morning; the preceding evening the hedge was viewed by hundreds of people. The plant, in Honolulu, comes in full flower only once or twice a year and is then a marvelous sight.

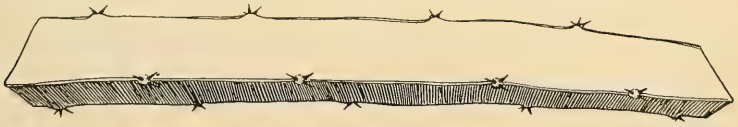

FIG. 265.—Hylocereus cubensis. ×0.66.

8. Hylocereus cubensis sp. nov.

Stems slender, much elongated, freely rooting, 3-angled, dull green, 2 to 4 cm. in diameter; margin of joints scarcely crenate, becoming horny; spines 3 to 5, black, conic, 2 to 3 mm. long; flowers large, white, about 20 cm. long; ovary bearing large leafy scales; fruit a little longer than broad, 10 cm. long, reddish.

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Flower on short branch of *Hylocereus monacanthus*.
(Natural size.)

Collected by Brother Léon on a wall, Jata Hills, near Guanabacoa, Province of Habana, Cuba, July 14, 1913 (No. 3719). Living specimens were introduced into the New York Botanical Garden which flowered in September 1917. We are disposed to refer here J. A. Shafer's No. 13931 from lime rocks at Portales, Province of Pinar del Rio, Cuba. A plant from the Isle of Pines sent to us by O. E. Jennings probably belongs here, but the poor specimen which we have seen does not enable us to definitely refer it to this species.

Figure 265 shows a section of a branch of the type specimen.

9. **Hylocereus lemairei** (Hooker) Britton and Rose, Contr. U. S. Nat. Herb. 12: 428. 1909.

*Cereus lemairei** Hooker in Curtis's Bot. Mag. 80: pl. 4814. 1854.
Cereus trinitatensis Lemaire and Herment, Rev. Hort. IV. 8: 642. 1859.

A somewhat slender, high-climbing vine; joints 3-angled, freely rooting on one side, 2 to 3 cm. in diameter, plain green; margins with slight elevations at the areoles; areoles 2 to 2.5 cm. apart; spines usually 2, very short, swollen at base, brownish; flower-buds elongated, acuminate; flower about 27 cm. long; tube, including ovary, 15 cm. long; scales on ovary and lower part of the tube ovate, dark green, with the margins and tips deep purple; scales on upper part of the tube much elongated, but marked like the lower ones; outer perianth-segments about 20, 12 cm. long, 1 cm. wide or less; edges slightly upturned, widely spreading or reflexed, yellowish green, sometimes a little purplish at the tip and the inner one somewhat rose-colored at the base; inner perianth-segments about 15, mostly oblanceolate, 3.5 cm. broad at the widest portion, acute, the lower portion pinkish, above nearly pure white; filaments cream-colored, about three-fourths the length of the inner perianth-segments; style thick, nearly as long as the inner perianth-segments; stigma-lobes cleft to the middle and the branches often notched at tip; flower somewhat odorous, not very pleasing; fruit purple, oblong, 6 to 7 cm. long, when mature splitting down the center almost to the base into 2 nearly equal parts and exposing the white flesh and black seeds.

Type locality: Not cited.

Distribution: Trinidad and Tobago. Perhaps also Surinam.

The above description was based upon specimens sent by Mr. Wm. Broadway in 1907 from Trinidad, which flowered in the New York Botanical Garden in July and August 1912 (No. 27689). Our reference (Contr. U. S. Nat. Herb. 12: 428) of this species to Antigua and doubtfully to Culebra and Porto Rico, in which we followed previous authors, can not be supported by specimens in our collections.

This is a very beautiful species which has long been in cultivation, but the native home of which, until recently, has not been known. In 1909, Mr. Broadway sent specimens from Trinidad which soon flowered, enabling us to identify it definitely. Sir Joseph Hooker, under *Cereus lemairei* in Curtis's Botanical Magazine, volume 80, plate 4814, says, "Nothing is positively known of its native country; but it happens that I have in my possession a drawing made in Antigua, undoubtedly of this species; so that it is probably a native of that island." A copy of this drawing is now in the United States National Herbarium, and shows quite a different species from *Cereus lemairei*, and may represent the *Hylocereus* collected in the spring of 1913 on Antigua by Dr. Rose (No. 3297), of which we have both herbarium and living specimens, but the drawing is without stem and Dr. Rose's specimens were without flowers; however, it may be that Hooker's drawing is of a flower of the commonly cultivated *H. undatus*.

Fig. 266.—Stigma-lobes of H. lemairei. ×0.7.

This is one of the few species of cacti having bifid stigma-lobes.

Illustration: Curtis's Bot. Mag. 80: pl. 4814, as *Cereus lemairei*.

Plate xxxi is from Mr. Broadway's Trinidad plant which flowered in the New York Botanical Garden. Figure 266 shows its style and stigma-lobes.

Cereus lemoinei (Möllers Deutsche Gärt. Zeit. 6: 92. 1891) may be only a misspelling of this name.

10. Hylocereus monacanthus (Lemaire).

Cereus monacanthus Lemaire, Hort. Univ. **6**: 60. 1845.

Stems green, 3-angled, the margins undulate; areoles remote, about 3 cm. apart, tomentose; spines usually single, sometimes 2, rigid, much swollen at base; flowers funnelform, large, 28 cm. long, 17 cm. broad; ovary and tube covered with large scales; outer perianth-segments narrow, greenish; inner perianth-segments oblong-ovate; filaments numerous, about 200, 8 to 9 cm. long, white but rose-colored at base; style thick, exserted, yellow; stigma-lobes numerous, spreading.

Type locality: Colombia.

Distribution: Colombia and Panama.

This species was first introduced by Cels and published in 1845. It was again introduced by Wercklé in 1905 and fully described by Weingart in 1911. Both Dr. Weber and Dr. Schumann considered it to be a variety of *Cereus martinii*.

A flower observed at the New York Botanical Garden September 6, 1918, and a plant brought by Dr. M. A. Howe from the Urava Islands in 1912, showed 2-forked stigma-lobes, the forks 2 to 3 mm. long; other flowers, previously observed, showed simple stigma-lobes.

Plate XXIX shows a branch of the plant collected by Dr. Howe, on Urava Island, Bay of Panama, in 1912, which flowered in the New York Botanical Garden in 1915.

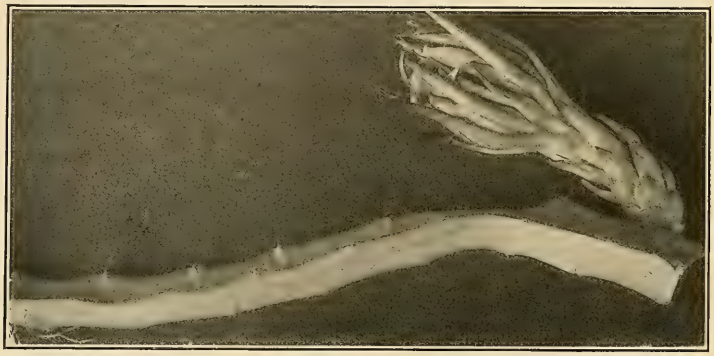

FIG. 267.—Hylocereus stenopterus.

11. Hylocereus stenopterus (Weber) Britton and Rose, Contr. U. S. Nat. Herb. **12**: 429. 1909.

Cereus stenopterus Weber, Bull. Mus. Hist. Nat. Paris **8**: 458. 1902.

A weak vine, not rooting freely from the sides, at least in cultivation, the joints 4 cm. broad, light green in color, not glaucous; ribs 3, thin; areoles slightly elevated; spines 1 to 3, small, yellow; flower 10 to 12 cm. long, opening at night, closing very early (completely closed at 9 a. m.); tube short, about 2 cm. long; perianth-segments all similar, reddish purple, linear, about 7 cm. long; stamens short, exserted; style white, thick, much exserted; stigma-lobes white, when closed forming an ovoid acuminate cluster; scales on ovary and flower-tube orbicular or the upper ones narrowly ovate, green, with purple margins.

Type locality: Vallée de Tuis, Costa Rica.

Distribution: Costa Rica, Central America.

This species is common in Costa Rica, and in recent years has been widely distributed by several Costa Rican collectors; it grows well under glass, and flowers frequently. It is the only *Hylocereus* in cultivation with red flowers except *H. extensus*.

Plate XXVII, figure 3, is from a plant obtained by Mr. William R. Maxon in San José, Costa Rica, in 1906, which flowered at the New York Botanical Garden. Figure 267 is from a photograph of a specimen which flowered in Washington from specimens received from the New York Botanical Garden in 1910 (No. 22197).

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Flower near end of branch of *Hylocereus undatus*. × 0.7.

12. **Hylocereus extensus** (Salm-Dyck).

Cereus extensus Salm-Dyck in De Candolle, Prodr. 3: 469. 1828.

Creeping and probably often climbing, bearing the usual aërial roots of the genus; joints green, rather slender, 1.5 cm. in diameter, 3-sided, the obtuse angles not at all winged; areoles remote, small, woolly and often setose; spines 2 or 3, rarely 4, very short and stout, dark brown, 1 to 2 mm. long; flowers large and handsome; tube green, cylindric; scales of the ovary ovate; scales of the tube rather short, becoming elongated above and passing into the narrow outer perianth-segments, greenish yellow, tipped and margined with red; inner perianth-segments oblong to obovate, acute, rose-red; style thick, longer than the stamens; stigma-lobes linear, entire; fruit not known.

Type locality: Not cited.

Distribution: Trinidad, according to Curtis's Botanical Magazine.

The above description is based on the figure and description found in Curtis's Botanical Magazine as below cited. This may or may not belong to the plant described by De Candolle (Prodr. 3: 469), for he describes the radial spines as 10 to 12, pilose and white, and the centrals as 2 to 4, small, rigid, and yellow; it is hardly the *Cereus extensus* of Pfeiffer (Enum. Cact. 119), where the inner perianth-segments are said to be white and obtuse.

Cereus subsquamatus Pfeiffer (Allg. Gartenz. 3: 380. 1835) is referred here by Pfeiffer.

Illustration: Curtis's Bot. Mag. 70: pl. 4066, as *Cereus extensus*.

13. **Hylocereus napoleonis** (Graham) Britton and Rose, Contr. U. S. Nat. Herb. 12: 429. 1909.

Cereus napoleonis Graham in Curtis's, Bot. Mag. 63: pl. 3458. 1836.

Stems much branched, light green, the joints with 3 acute angles and concave sides; angles tuberculate, with repand intervals, not at all horny; areoles about 4 cm. apart; spines 4 or 5, rigid, about 9 mm. long, with swollen bases; flowers 20 cm. long and nearly as broad; tube 7.5 cm. long, green, bearing a few subappressed, deep red scales, gradually enlarging upward; outer perianth-segments yellow, lanceolate, linear; inner perianth-segments pure white, spatulate-lanceolate, crenate at apex; stamens numerous, yellow; pistil stout; stigma-lobes numerous, entire.

Type locality: Unknown; described from a cultivated plant.

Distribution: West Indies and southern Mexico, according to Schumann; but we know it definitely only from the original illustration.

The origin of this species has long been in doubt. It was described by Graham at the time it flowered in the botanical garden at Edinburgh. The plant had then been in cultivation for about ten years, having been sent by a Mr. McKay of Clapton, but without any record of its source. It is possible that this species should be referred to the true *H. triangularis*, although Pfeiffer states in the most emphatic terms that they are very distinct. According to Loudon (Gard. Dict. 2: 65. 1827) *Cactus napoleonis* occurs in a list of new plants offered by L. C. Noisette, a nurseryman in Paris. This was about nine years before the name was published in the Botanical Magazine.

Cereus triangularis major Salm-Dyck, Allg. Gartenz. 4: 80. 1836 and *Cactus napoleonis* Hortus, unpublished names, are often given as synonyms.

Cereus lanceanus (G. Don in Sweet, Hort. Brit. ed. 3. 285. 1839), *C. inversus*, and *C. schomburgkii* are names of garden plants which are referred to this relationship by Förster (Handb. Cact. 422. 1846).

Plants from Santo Domingo resemble the original illustration in armament. We have these in cultivation, both at Washington and at New York, but they have not flowered (Rose, Nos. 3734, 3839, and 4147). Boldingh (Fl. Ned. West Ind. 296) records the plant from Aruba.

Pfeiffer (Enum. Cact. 117. 1837) referred here Burmann's plate of Plumier (pl. 199, f. 2) which is perhaps the best disposal to make of it. The fruit, however, has spiny areoles and in this respect resembles *Acanthocereus pentagonus*. Gosselin considered it an undescribed species which he called *Cereus plumieri* (Gosselin, Bull. Soc. Bot. France, 54: 668. 1907).

Illustrations: Curtis's Bot. Mag. 63: pl. 3458; Loudon, Encycl. Pl. ed. 2. f. 17363, both as *Cereus napoleonis;* (?) Plumier, Pl. Amer. ed. Burmann, pl. 200, f. 1, as *Cactus* etc.

14. Hylocereus trigonus (Haworth) Safford, Ann. Rep. Smiths. Inst. **1908**: 556. 1909.

?*Cactus triangularis foliaceus* Jacquin, Stirp. Amer. 152. 1763.
Cereus trigonus Haworth, Syn. Pl. Succ. 181. 1812.
Cereus venditus Paulsen, Journ. Bot. **56**: 235. 1918.

Stems slender, 2 to 3 cm. broad, clambering over bushes or rocks, sometimes 10 meters long, deep green; joints 3-angled, the margin of the ribs not horny, strongly undulate, the areoles borne on the tops of the undulations; spines usually 8, 4 to 7 mm. long, stiff, at first greenish, soon dark brown; accessory spines or bristles usually 2; perianth large; ovary bearing large foliaceous scales; fruit oblong or oblong-obovoid, red, 10 cm. long, becoming nearly smooth.

Type locality: Not cited.

Distribution: Hispaniola, Porto Rico, Vieques, Culebra, St. Jan, St. Thomas, Tortola, Virgin Gorda, and St. Croix. Recorded by Boldingh (Fl. Ned. West Ind. 297) from St. Eustatius, Saba, and St. Martin.

This species, although known to Plumier and illustrated by Burmann (1750–1760), was not taken up as a species until 1812, when it was described by Haworth. In 1803 Haworth had described it as a variety of *Cactus triqueter* (Misc. Nat. 189), but had said it was twice the size. *Cereus venditus* Paulsen is based upon the juvenile form of this species from a plant collected on the Island of St. Jan.

FIG. 268.—Hylocereus trigonus.

Illustrations: Safford, Ann. Rep. Smiths. Inst. **1908**: pl. 12. Plumier, Pl. Amer. ed. Burmann, pl. 200, f. 2, as *Cactus* etc.; Contr. U. S. Nat. Herb. **8**: pl. 25, as *Cereus* sp.;? Jacquin, Stirp. Amer. pl. 181, f. 65, as *Cactus triangularis foliaceus;* Loudon, Encycl. Pl. f. 6872, as *Cactus trigonus*.

Plate XXXVI, figure 1, represents a fruiting joint of a Porto Rican plant in the collection of the New York Botanical Garden. Figure 268 is from a photograph taken by F. E. Lutz near Arecibo, Porto Rico.

15. Hylocereus triangularis (Linnaeus) Britton and Rose, Contr. U. S. Nat. Herb. **12**: 429. 1909.

Cactus triangularis Linnaeus, Sp. Pl. 468. 1753.
Cereus compressus Miller, Gard. Dict. ed. 8. No. 10. 1768.
Cereus triangularis Haworth, Syn. Pl. Succ. 180. 1812.

High-clambering or creeping vines, sharply 3-angled, 3 to 4 cm. broad, giving off numerous long aërial roots; margin not horny, nearly straight or slightly elevated at the areoles; areoles about 2 cm. apart; principal spines 6 to 8, acicular, but with swollen bases; flowers 20 cm. long or more; outer perianth-segments linear-lanceolate, acuminate, 6 to 8 cm. long, longer than the inner segments; inner perianth-segments white, oblong; scales on the ovary and flower-tube oblong, green, 2 to 5 cm. long; fruit red.

Type locality: Jamaica.

Distribution: Very common on rocks and trees along the coast of Jamaica.

Plants of *H. triangularis* were collected by John F. Cowell in Panama, probably not native there, however.

Cereus triangularis pictus De Candolle (Prodr. 3: 468) is said to have yellow or yellow and green joints, with spines often setiform, not rigid.

M. E. Eaton del

Flower on short branch of *Hylocereus lemairei*. × 0.7.

Salm-Dyck (Cact. Hort. Dyck. 1849. 220. 1850) described *C. triangularis uhdeanus*, based upon a cultivated Mexican plant. It is described with 4 to 6 radial spines and 1 central, yellow, minute. Salm-Dyck was uncertain whether it was a garden variety or a distinct species.

Cereus anizogonus Salm-Dyck (Cact. Hort. Dyck. 1849. 52. 1850) was given as a synonym of *Cereus triangularis*.

Miller, who first published *Cereus compressus* distinguished it from *C. triangularis*, but based it upon Plukenet's illustration (Opera Bot. 1: pl. 29, f. 3), which Linnaeus referred to *Cactus triangularis*, and which we believe represents the Jamaican plant. Martyn in a later edition of Miller's Gardeners' Dictionary refers Miller's *Cereus compressus* to *Cactus pentagonus* (?), which seems hardly correct. The Index Kewensis refers *Cereus compressus* to Mexico. *Cephalocereus compressus* (Monatsschr. Kakteenk. Index, vol. 1 to 20. 36. 1912) belongs here.

Illustrations: Plukenet, Opera Bot. 1: pl. 29, f. 3, as *Cereus erectus cristatus*; Bradley, Hist. Succ. Pl. ed. 2. pl. 3, as *Cereus americanus triangularis* etc.

Figure 269 shows a joint of a plant collected by Dr. Britton near Mandeville, Jamaica, in 1907.

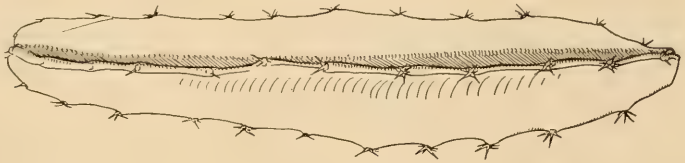


FIG. 269.—Joint of Hylocereus triangularis. ×0.5.

16. Hylocereus antiguensis sp. nov.

Stems high-clambering, forming great masses in the crotches of high trees or covering the tops of low trees; joints 2 to 4 cm. thick, 3-angled, rarely 4-angled; margins of ribs not horny, hardly undulate; areoles 2.5 to 3.5 cm. apart; principal spines 2 to 4, about 6 mm. long or less, accessory ones or bristles 2 to 5; flowers 14 cm. long; outer perianth-segments linear; inner perianth-segments yellow, at least drying so, broader than the outer segments; flower-tube bearing linear acute scales.

This species is nearest *H. trigonus*, but the margins of the ribs are very different. The description is based on specimens collected by Dr. Rose in Antigua (No. 3297), of which we have both living and herbarium specimens. It flowered in the New York Botanical Garden in 1916.

Figure 270 is from a photograph taken by Paul G. Russell on Antigua in 1913.

17. Hylocereus calcaratus (Weber) Britton and Rose, Contr. U. S. Nat. Herb. **12**: 428. 1909.

Cereus calcaratus Weber, Bull. Mus. Hist. Nat. Paris **8**: 458. 1902.

A climbing vine, the joints 4 to 6 cm. wide, strongly 3-winged, green, the margin divided into numerous prominent lobes; areoles small, from the upper angles of the marginal lobes, spineless but bearing 2 to 4 small, white bristles.

Type locality: Port Limón, Costa Rica.

Distribution: Costa Rica.

Neither flowers nor fruit were known to Dr. Weber when he described the plant; we have had it for a number of years and it has not yet flowered with us. It is very unlike the other species of *Hylocereus*, having very peculiar stems and no spines, and it may not be of this genus.

Figure 271 shows a joint of a plant, which was obtained by W. R. Maxon, in cultivation at San José, Costa Rica, in 1906.

HYLOCEREUS sp.

Dr. J. A. Samuels collected a species of this genus in the forest plantation, La Poule, Surinam, April 24, 1916 (No. 305), which is the first record we have of this genus being found in Dutch Guiana. Dr. Samuels's plants are juvenile ones, at least in part, as the spines on some specimens are represented by 10 to 12 spiny bristles at each areole; other branches which are more mature are less than 2 cm. broad, 3-angled, with the areoles only 1 to 1.5 cm. apart; the margin of the rib is almost straight; spines 3 to 5, brown, 2 to 3 mm. long. The specimens are without flowers or fruit. While reading the last proof, specimens have been received from Gerold Stahel, of Paramaribo, Surinam, which lead us to believe that the plant from that country is *Hylocereus lemairei*. Here probably belongs the plant from Surinam which Linnaeus called *Cactus triangularis* (Amoen. Acad. 8: 257. 1785).

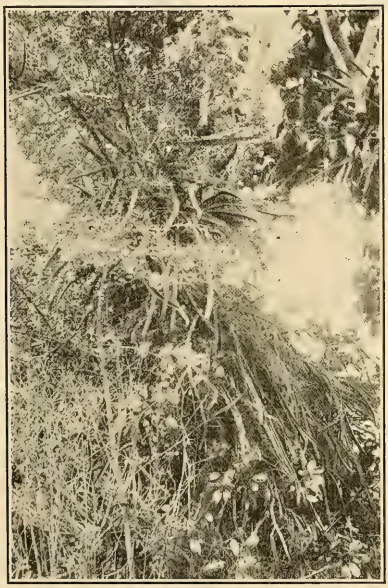


FIG. 270.—Hylocereus antiguensis.

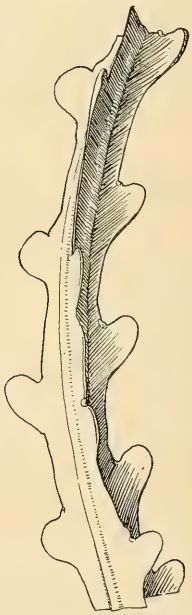


FIG. 271.—Joint of H. calcaratus. ×0.5

HYLOCEREUS sp.

A species, apparently of this genus. It is a long, clambering plant running over and through tops of shrubs and trees and sometimes killing them, with strongly 3-angled joints, the margins of the ribs rather thick, hardly undulate; the areoles 5 to 6 cm. apart, with 6 to 8 subulate spines, the longer 12 to 15 cm. long. It was collected by E. A. Goldman at Carrizal, Vera Cruz, May 25, 1901 (No. 697). Its flowers and fruit are unknown.

HYLOCEREUS sp.

Branches slender, 3-angled, or sometimes nearly terete, 2 to 3 cm. broad, dull green, sometimes perhaps glaucous; margin not horny; areoles often distant, sometimes 5 cm. apart, borne on prominent and more or less reflexed knobs; spines brown, 2 to 4, stout, conic.

Collected by Dr. Rose near Puerto Cabello, Venezuela, in 1916 (No. 21870).

This very peculiar plant we have not been able to refer definitely to any of the above species. It suggests in a way the other *Hylocereus*, which Dr. Rose also obtained in Venezuela (No. 21835) and which we have described as new in the Appendix. It, however, has not yet flowered in the New York Botanical Garden where it is now being grown.

PUBLISHED SPECIES, PERHAPS OF THIS GENUS, KNOWN TO US ONLY FROM DESCRIPTION.

CEREUS RADICANS De Candolle, Prodr. 3: 468. 1828.

This species has not been well understood since its original description. It is probably either a *Selenicereus* or a *Hylocereus*. It was described as prostrate, light green in color, 3 or 4-angled, with rigid, slender, brown spines, of which 6 to 9 are radials and 1 is central. De Candolle refers it to Tropical America; Pfeiffer (Enum. Cact. 114), who redescribed it in 1837, refers it to Tropical America and the Antilles. Schumann did not know it, but referred it to South America.

Cereus reptans Salm-Dyck (De Candolle, Prodr. 3: 468. 1828) is an unpublished name which was first mentioned under *C. radicans*, while *Cereus reptans* Willdenow is referred by De Candolle to *Cereus pentagonus*.

CEREUS HORRENS Lemaire, Hort. Univ. 6: 60. 1845.

Climbing and rooting; ribs 3, prominent, strongly tubercled; areoles distant, bearing copious white down; spines 5 to 7, whitish, variable, stout, very long.

This species seems to have been lost. Its flowers and fruit are unknown as is also its origin. It is probably a *Hylocereus*.

2. WILMATTEA gen. nov.

A climbing cactus, epiphytic and rooting along the sides of the joints, slender, with few short spines; flowers solitary at the areoles (in one case 2 flowers seen), small for the tribe, nocturnal, with a narrow limb and with a very short tube; ovary small, covered with ovate, imbricating, reddish scales, each subtending a small areole filled with felt and occasionally with 1 bristle or more, perhaps sometimes naked; filaments and style short.

One species is known, native of Guatemala and Honduras. The genus is named in honor of Mrs. T. D. A. Cockerell (Wilmatte P. Cockerell) in recognition of her many discoveries of rare plants and animals in Central America.

In habit this plant resembles a slender-stemmed species of *Hylocereus* while the flower and ovary bear similar scales and this led us at one time to consider it as a species of that genus. The flowers, however, are so much smaller with scarcely any tube and bearing felt and bristles in their axils that we now regard it as generically distinct.

1. Wilmattea minutiflora.

Hylocereus minutiflorus Britton and Rose, Contr. U. S. Nat. Herb. 16: 240. 1913.
Cereus minutiflorus Vaupel, Monatsschr. Kakteenk. 23: 86. 1913.

A slender, high-climbing vine, the joints 3-angled, deep green, the angles sharp but not winged, not horny-margined; areoles 2 to 4 cm. apart; spines usually 1 to 3, minute, brownish; flowers only 5 cm. long, opening at night, rarely remaining open until 9 o'clock in the morning, very fragrant; flower-tube only 10 mm. long, or even less; outer perianth-segments linear, red on the midvein and at the tip, 3 to 4 cm. long; inner perianth-segments very narrow, acute, white; stamens white, about 1 cm. long, borne in a series at the base of the inner perianth-segments; scales on the ovary sometimes bearing bristles in their axils, sometimes naked, oblong to ovate, purple or greenish at base; style white, 2 cm. long, thick; stigma-lobes white.

Type locality: Near Lake Izabel, Guatemala.
Distribution: Guatemala and Honduras.

A cutting of the plant developed 3 thin wings 10 mm. wide, the areoles producing 2 to 5 long white hairs but no spines. In all the young joints 5 to 8 wings started, but all but

3 soon dropped out. In some cases the joints are nearly terete at base, or in cultivation develop long terminal shoots which are nearly terete.

This species was first collected by R. H. Peters in 1907. It was again collected by Mrs. T. D. A. Cockerell at Quirigoa in 1912, who sent living plants to Washington which flowered September 27, 1917, and in 1920 Harry Johnson sent us living specimens from Guatemala. In 1916 Francis J. Dyer sent from Honduras what seems to be this species.

Illustration: Contr. U. S. Nat. Herb. **16**: pl. 69, as *Hylocereus minutiflorus.*

Plate XXXII, figure 2, shows a flowering branch of the type specimen, which was collected by R. H. Peters in Guatemala in 1907. Figure 272 shows a flowering joint of the type specimen, photographed in Washington.

FIG. 272.—Wilmattea minutiflora. ×0.6.

3. **SELENICEREUS** (Berger) Britton and Rose, Contr. U. S. Nat. Herb. **12**: 429. 1909.

Slender, trailing, climbing or clambering, elongated cacti, the joints ribbed or angled, irregularly giving off aërial roots; areoles small, sometimes elevated on small knobs, bearing small spines or in one species spineless; flowers large, often very large, nocturnal; flower-tube elongated, somewhat curved; scales of ovary and flower-tube small, usually with long felt, hairs and bristles in their axils; upper scales and outer perianth-segments similar, narrow, greenish, brownish, or orange; inner perianth-segments broad, white, usually entire; filaments elongate, weak, numerous, in two clusters distinctly separated, one cluster forming a circle at top of flower-tube, the other scattered over the ong, slender throat; style elongated, thick, often hollow; stigma-lobes slender, numerous, entire; ruit large, reddish, covered with clusters of deciduous spines, bristles, and hairs.

Type species: *Cactus grandiflorus* Linnaeus.

The name is from the Greek and signifies moon-cereus, the plants being night-blooming.

All the species are clambering vines with aërial roots, and in the tropics often reach the tops of high trees; where there are no trees or shrubs, they trail over rocks and walls. Most of them have very large flowers; in fact, one of the largest flowered species of the family (*S. macdonaldiae*) belongs here. Several of the species, such as *S. hamatus, S. grandiflorus, S. macdonaldiae,* and *S. pteranthus* (better known as *Cereus nycticalus*), have long been favorites with amateurs. In our studies of the genus we have had several hundred growing plants under observation, representing all the species, and specimens of all have bloomed. The species of the genus range from southern Texas through eastern Mexico, Central America, the West Indies and along the northern coast of South America, while one species has been reported from Argentina. Sixteen species are here recognized.

M. E. Eaton del.

1. Fruit of *Hylocereus undatus*.
2. Flowering branch of *Wilmattea minutiflora*.
3. Longitudinal section of fruit of *Selenicereus grandiflorus*.

(All natural size.)

Key to Species.

Areoles of the ovary and flower-tube bearing long hairs.
- Branches ribbed, angled or subterete, not spurred.
  - Areoles of the branches borne on the ribs or angles.
    - Spines of the branch-areoles acicular.
      - Hairs of flower-areoles tawny or whitish ..... 1. *S. grandiflorus*
      - Hairs of flower-areoles bright white.
        - Branches 4 or 5-angled; stem-areoles without bristly hairs.
          - Spines brown ..... 2. *S. urbanianus*
          - Young spines yellow ..... 3. *S. coniflorus*
        - Branches 7 to 10-ribbed; stem-areoles with many bristly hairs ..... 4. *S. hondurensis*
    - Spines of the branch-areoles short, conic.
      - Branches 9 or 10-ribbed; branch-areoles with many appressed hairs ..... 5. *S. donkelaarii*
      - Branches 4 to 6-ribbed; young branch-areoles with few long hairs.
        - Stems stout, 3 to 5 cm. thick ..... 6. *S. pteranthus*
        - Stems slender, 1.5 to 3 cm. thick.
          - Hairs of flower-areoles white.
            - Ribs not tubercled ..... 7. *S. kunthianus*
            - Ribs tubercled ..... 8. *S. brevispinus*
          - Hairs of flower-areoles brown ..... 9. *S. boeckmannii*
  - Areoles of the branches borne on prominent knobs ..... 10. *S. macdonaldiae*
- Branches with a stout, deflexed spur under each areole ..... 11. *S. hamatus*

Areoles of flower-tube and ovary without long hairs.
- Areoles of the branches spiniferous.
  - Spines of the branch-areoles acicular ..... 12. *S. vagans*
  - Spines of the branch-areoles short, conic.
    - Ribs 7 or 8, obtuse; spines from the areoles on the ovary 1 to 3 ..... 13. *S. murrillii*
    - Ribs 4 to 6, acute; spines from the areoles on the ovary 10 or more ..... 14. *S. spinulosus*
- Areoles of the branches unarmed.
  - Ribs prominent, 3 to 5; flowers white ..... 15. *S. inermis*
  - Ribs low, 6 to 12; flowers red ..... 16. *S. werckleri*

1. Selenicereus grandiflorus (Linnaeus) Britton and Rose, Contr. U. S. Nat. Herb. **12**: 430. 1909.

Cactus grandiflorus Linnaeus, Sp. Pl. 467. 1753.
Cereus grandiflorus Miller, Gard. Dict. ed. 8. No. 11. 1768.
Cereus grandiflorus affinis Salm-Dyck, Cact. Hort. Dyck. 1849. 51, 216. 1850.

Stems clambering, often 2.5 cm. in diameter, green or bluish green; ribs usually 7 or 8, sometimes fewer, low, separated by broad, rounded intervals; spines acicular, various, 1 cm. long or less, yellowish brown or brownish, in age gray, intermixed with the numerous whitish hairs; flower-buds covered with tawny hairs; flowers about 18 cm. long; outer perianth-segments narrow, salmon-colored; inner perianth-segments white, acute, entire; style often longer than the inner perianth-segments; fruit ovoid, 8 cm. long.

Type locality: Jamaica.

Distribution: Jamaica and Cuba. Widely planted and escaped from cultivation in tropical America.

We have observed seeds germinating within the fruit of this species.

S. grandiflorus and perhaps some of its allies are used medicinally as a heart tonic. In the trade the plant is sometimes called *Cactus mexicanus*.

Cereus scandens minor Boerhaave (Arendt, Monatsschr. Kakteenk. **1**: 82. 1891) probably refers to this species, as does also *C. grandiflorus* var. *minor* Salm-Dyck and var. *spectabilis* Karwinsky (Förster, Handb. Cact. 415. 1846). *C. grandiflorus uranos* Riccobono (Boll. R. Ort. Bot. Palermo **8**: 249. 1909), doubtless the same as *Cereus uranos* Hortus, is said to be but a form of this species. The *C. uranus nycticalus* mentioned (Monatsschr. Kakteenk. **3**: 117. 1893) is a hybrid and is like *C. grandiflorus callicanthus* Rümpler (Förster, Handb. Cact. ed. 2. 750. 1885; *Cereus callicanthus* Monatsschr. Kakteenk. **3**: 109. 1893). *Cereus grandiflorus viridiflorus* (Monatsschr. Kakteenk. **6**: 80. 1896) is a garden hybrid. The varieties *haitiensis* and *ophites* (Monatsschr. Kakteenk. **13**: 183. 1903) may belong to related species rather than to *Selenicereus grandiflorus*. This is probably true of the varieties *grusonianus* and *mexicanus* listed in Haage and Schmidt Catalogues. *Cereus maximiliani*, *C. grandiflorus maximiliani*, and *C. nycticalus maximiliani* are doubtless hybrids with one of the common cultivated species, perhaps *S. grandiflorus*, as believed by Berger. *Cereus schmidtii* (Monatsschr. Kakteenk. **4**: 189. 1894) may be *Cereus grandiflorus schmidtii*

(Berger, Hortus Mortolensis 70. 1912). *Cereus grandiflorus barbadensis* is also given by Berger.

The flowers of *S. grandiflorus* are almost identical with those of the 8 following species, which differ essentially only in vegetative characters and armament.

Illustrations: Andrews, Bot. Rep. **8**: pl. 508; De Candolle, Pl. Succ. **1**: pl. 52; Descourtilz, Fl. Med. Antill. **1**: pl. 65; Loddiges, Bot. Cab. **17**: pl. 1625; Loudon, Encycl. Pl. f. 6873, as *Cactus grandiflorus;* Cact. Journ. **1**: 125; Curtis's Bot. Mag. **62**: pl. 3381; Dict. Gard. Nicholson **1**: f. 407; Gartenflora **53**: 68, 401; Schumann, Gesamtb. Kakteen f. 34; Miller, Icones pl. 90; Rümpler, Sukkulenten f. 69; Monatsschr. Kakteenk. **10**: 60; Cycl. Amer. Hort. Bailey **1**: f. 414, all as *Cereus grandiflorus;* Trew, Pl. Ehret. pl. 31, 32, as *Cereus gracilis scandens* etc.; Cact. Journ. **1**: 79, as *Cereus grandiflorus major.*

Plate XXXII, figure 3, shows a section of the fruit of a plant in the New York Botanical Garden sent from Cuba by C. F. Baker in 1907, with germinated seeds within; plate XXXIII, figure 1, shows a flowering branch, figure 2 shows the tip of a branch, and figure 3 its fruit.

2. Selenicereus urbanianus (Gürke and Weingart) Britton and Rose, Contr. U. S. Nat. Herb. **16**: 242. 1913.

Cereus urbanianus Gürke and Weingart, Notizbl. Bot. Gart. Berlin **4**: 158. 1904.
Selenicereus maxonii Rose, Contr. U. S. Nat. Herb. **12**: 430. 1909.
Cereus roseanus Vaupel, Monatsschr. Kakteenk. **23**: 27. 1913.
Cereus paradisiacus Vaupel, Monatsschr. Kakteenk. **23**: 37. 1913.

Stems light green, but often becoming deep purple throughout, often 3 cm. in diameter; ribs 4 or 5, rarely 3 or 6, rather prominent but less so on the older branches; areoles small, white; spines 1 cm. long or less, brownish; reflexed bristles or hairs from the lower part of the areoles several, white, longer than the spines; flowers 20 to 30 cm. long; uppermost scales and outer perianth-segments narrow, brown to orange, paler within; inner perianth-segments spatulate to oblanceolate, the upper part more or less serrated, the very broad apex sometimes apiculate or entire and acuminate, pure white; stamens and style yellowish green, longer than the inner perianth-segments; flower-tube 17 cm. long, reddish brown, its areoles and those of the ovary bearing long, white hairs.

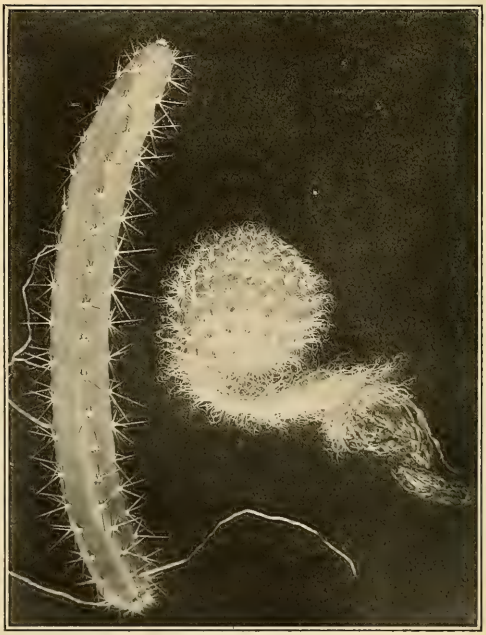
Type locality: Haiti.

Distribution: Cuba and Hispaniola.

Plants collected by Dr. John K. Small, escaped from cultivation near Halendale, Florida, are, apparently, referable to this species.

Illustrations: Monatsschr. Kakteenk. **16**: 137, as *Cereus urbanianus;* Blühende Kakteen **3**: pl. 153, 154, as *Cereus paradisiacus.*

Plate XXXIV shows a flowering branch of a plant collected by N. L. Britton and J. F. Cowell at El Cobre, Cuba, in 1912.



FIGS. 273 and 274.—Branch and fruit of Selenicereus coniflorus.

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1. Flowering branch of *Selenicereus grandiflorus*.
2. Tip of branch of the same.
3. Fruit of the same.

(Natural size.)

3. **Selenicereus coniflorus** (Weingart) Britton and Rose, Contr. U. S. Nat. Herb. **12**: 430. 1909.

Cereus coniflorus Weingart, Monatsschr. Kakteenk. **14**: 118. 1904.
Cereus nycticalus armatus Schumann, Gesamtb. Kakteen 147. 1897.
Selenicereus pringlei Rose, Contr. U. S. Nat. Herb. **12**: 431. 1909.
Cereus jalapaensis Vaupel, Monatsschr. Kakteenk. **23**: 26. 1913.

Stems high-climbing, giving off numerous aërial roots, pale green, becoming purplish along the ribs, 5 or 6-ribbed; intervals between the ribs either depressed or shallow; margins of the ribs slightly wavy to strongly knobby; spines acicular, pale yellow, the radials 4 to 6, with 1 central, porrect, 1 to 1.5 cm. long; bristles from the lower part of areoles, 2, reflexed; buds globular, covered with white hairs; flowers about 22 to 25 cm. long; outer perianth-segments linear, light orange or bronzed to lemon-yellow; inner perianth-segments pure white, apiculate; filaments greenish; style much shorter than the inner perianth-segments; stigma-lobes greenish yellow; scales on the ovary and flower-tube linear, reddish, their axils bearing white hairs and spines; fruit globose, about 6 cm. in diameter.

Type locality: Not cited; based on cultivated plants.
Distribution: Eastern Mexico, especially Vera Cruz.

This is a vigorous climbing vine, flowering freely in cultivation. It is often known in collections as *Cereus nycticalus armatus*. Living material was collected by Dr. Rose in Mexico in 1905, where he learned it was being gathered in large quantities and shipped to the United States, as *Cereus grandiflorus*, to be manufactured into medicine.

Illustration: Schumann, Gesamtb. Kakteen f. 35, as *Cereus nycticalus*.

Plate XXXV is from a plant collected by Dr. Rose in Mexico in 1905, which flowered at the New York Botanical Garden, May 8, 1913. Figure 273 shows a joint and figure 274 a fruit of a plant in the collection of the United States Department of Agriculture.

4. **Selenicereus hondurensis** (Schumann) Britton and Rose, Contr. U. S. Nat. Herb. **12**: 430. 1909.

Cereus hondurensis Schumann in Weingart, Monatsschr. Kakteenk. **14**: 147. 1904.

Climbing and clambering, 1.5 cm. in diameter, green, becoming in winter deep purple; ribs 7 to 10, low; areoles 6 to 10 mm. apart; spines rather short, 5 to 7 mm. long, but acicular, usually surrounded by numerous much longer white hairs or bristles, especially conspicuous on young branches; flowers 20 cm. long or more; outermost perianth-segments brownish and linear, the outer ones linear and acuminate, yellow; inner perianth-segments pure white, 10 cm. long, 10 to 15 mm. broad; scales on ovary and flower-tube linear, bearing numerous long bristly hairs in their axils; fruit not known.

Type locality: Honduras.
Distribution: Honduras and Guatemala.

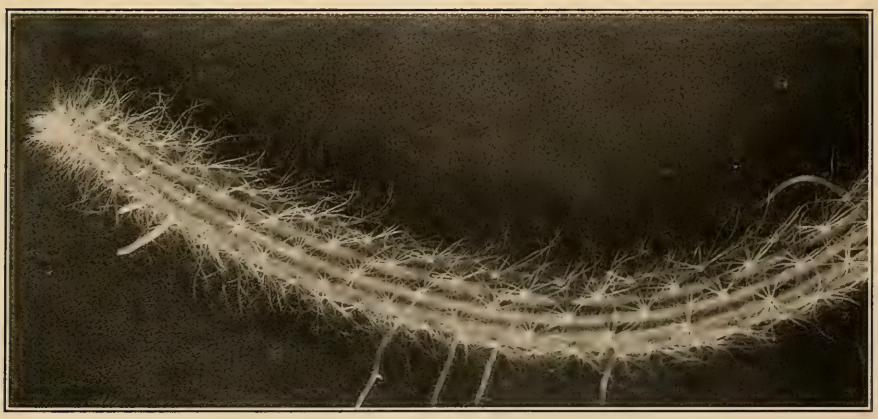

FIG. 275.—Tip of branch of Selenicereus hondurensis. Natural size.

This species has long passed as *Cereus kunthianus* and is the plant described by Schumann under that name.

Figure 275 is from a photograph of a branch of a plant collected by O. F. Cook at Panzos, Guatemala, in 1907.

5. Selenicereus donkelaarii (Salm-Dyck).

*Cereus donkelaarii** Salm-Dyck, Allg. Gartenz. **13**: 355. 1845.

Stems elongated, creeping or ascending, 8 meters long or more, slender, about 1 cm. thick; ribs 9 or 10, obtuse, often indistinct; spines in clusters of 10 to 15, the radials 3 to 4 mm. long, setaceous, appressed; central spine 1 or several, 1 to 2 mm. long; flowers 18 cm. long, the slender tube 6 to 7 cm. long; outer perianth-segments reddish, linear; inner perianth-segments white, entire, 6 to 8 cm. long, about 1 cm. wide, acuminate; stamens and style nearly white above, greenish below; fruit unknown.

Type locality: Not cited.
Distribution: Yucatan, Mexico.

FIG. 276.—Selenicereus donkelaarii.

This species has long been known only from cultivated plants. Schumann reports it as from Brazil but this we are now disposed to question since it has recently been discovered by Dr. George Gaumer in Yucatan growing in dense forests, and we now have living specimens from his collections. We now find that Major E. A. Goldman collected it some years ago in Yucatan but it was not recognized at that time. Goldman's plant grows in dense patches on Cantay Island, collected April 22, 1901 (No. 661).

Figure 276 represents a sterile branch of the plant as grown in the collection of the United States Department of Agriculture.

6. Selenicereus pteranthus (Link and Otto) Britton and Rose, Contr. U. S. Nat. Herb. **12**: 431. 1909.

Cereus pteranthus Link and Otto, Allg. Gartenz. **2**: 209. 1834.
Cereus nycticallus† Link in A. Dietrich, Verh. Ver. Beförd. Gartenb. **10**: 372. 1834.
Cereus brevispinulus Salm-Dyck, Hort. Dyck. 339. 1834.

Stems stout, often 3 to 5 cm. in diameter, bluish green to purple, strongly 4 to 6-angled; ribs of young branches sometimes 2 to 3 mm. high; spines 1 to 4, 1 to 3 mm. long, dark, conic; flowers 25 to 30 cm. long, very fragrant; the tube and throat 13 cm. long, swollen above, 5 cm. in diameter; outer perianth-segments linear, 12 cm. long; inner perianth-segments white, spatulate-oblong, 3 to 4 cm. broad above, acuminate; filaments numerous, greenish to cream-colored, the upper row reaching forward, upturned near the tip, 6 cm. long; lower stamens elongated, unequal, 8 to 12 cm.

*The species was originally spelled in the Allgemeine Gartenzeitung *Cereus donkelaarii* but was indexed in the same book as *Cereus donkelarii*. It is also written *Cereus donkelaeri*.

†Although the usual spelling of this name is with one l, it was originally spelled by Link as it is here.

M. E. Eaton del.

Flowering branch of *Selenicereus urbanianus*.
(Natural size.)

long, weak, reclining on the lower side of the flower-tube and attached along the inner face of the tube for 7 to 8 cm.; tube-proper about 2 cm. long, yellow within; style 20 cm. long, yellowish green, bronzed above, thick but weak; stigma-lobes numerous, linear; ovary covered with long white silky hairs and bristles, 10 to 12 mm. long; fruit globular, red, 6 to 7 cm. in diameter.

Type locality: Mexico.

Distribution: Mexico; known to us only from cultivated specimens or from plants escaped from gardens.

Cereus antoinii (Pfeiffer, Enum. Cact. 114. 1837) is known only as a synonym of *Cereus nycticallus*. *Cereus rosaceus*, first mentioned by De Candolle (Prodr. 3: 471. 1828), is only a garden name which Pfeiffer (Enum. Cact. 114. 1837) referred to *C. nycticallus*.

Cereus peanii Beguin first mentioned in Rebut's Catalogue (Monatsschr. Kakteenk. 4: 173. 1894) has never been formally published. According to Weber, it is a hybrid of which *Cereus nycticallus* is one of the parents. *Cereus nothus* (Monatsschr. Kakteenk. 4: 173. 1894), grown by Gruson but never described, is, according to Schumann, *Cereus pterogonus*. *Cereus nothus* Wendland (Schumann, Gesamtb. Kakteen 143. 1897), however, he says is a hybrid.

Several varieties of this species have been named, most of which doubtless belong here; at least the following do: *C. nycticalus gracilior* Haage (Förster, Handb. Cact. 416. 1846), *C. nycticalus maximiliani* (Arendt, Monatsschr. Kakteenk. 1: 58. 1891), and *C. nycticalus viridior* Salm-Dyck (Cact. Hort. Dyck. 1849. 51, 216. 1850). It has frequently been used by gardeners in making hybrids, especially with *S. grandiflorus* and *Heliocereus speciosus*.

This is a common plant in conservatories.

Illustrations: Amer. Garden 11: 471; Dict. Gard. Nicholson 1: f. 408; Lemaire, Cact. f. 11; Rümpler, Sukkulenten f. 70, 71; Verh. Ver. Beförd. Gartenb. 10: pl. 4, all as *Cereus nycticallus*.

Plate XXXVIII, figure 1, shows a fruiting branch of a plant obtained from J. E. Barre in 1901, which flowered in the New York Botanical Garden in 1915.

7. Selenicereus kunthianus (Otto) Britton and Rose, Contr. U. S. Nat. Herb. 12: 430. 1909.

Cereus kunthianus Otto in Salm-Dyck, Cact. Hort. Dyck. 1849. 217. 1850.

Stems elongate, weak, bluish green or purplish, 1 to 2.5 cm. thick; ribs 5 to 10, low; spines only 1 to 2 mm. long, 7 to 9; flowers 24 cm. long, the slender tube about 12 cm. long; outer perianth-segments numerous, linear, shorter than the white inner ones; axils of scales on ovary and flower-tube with long silky hairs; fruit unknown.

Type locality: Not cited.

Distribution: Known only in cultivation; said to have come from Honduras.

We are basing our determination of this species on a plant sent under this name to Dr. Rose from the Berlin Botanical Garden (1909); this has 5-angled stems. The original description of the species calls for 7-angled to 10-angled stems, however. There may be this amount of variability in the stems, or there may be two species involved.

Figure 277 shows a branch of a plant in the collection of the New York Botanical Garden, received from the Berlin Botanical Garden.

8. Selenicereus brevispinus sp. nov.

Stems rather stout, climbing or clambering, 2 to 3 cm. thick, in cultivation somewhat branching, light green, the growing branches tipped with white hairs; ribs 8 to 10, separated by narrow intervals, undulating, with knobby areoles; areoles circular, with short tawny felt; spines about 12, conic, stiff, about 1 mm. long, the 3 or 4 centrals thicker than the somewhat curved or hooked radials; bristles from the lower parts of the areoles, 6 or more, longer than the spines, hair-like; flower-

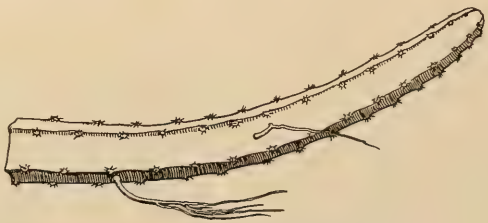

FIG. 277.—Branch of S. kunthianus. ×0.5.

buds covered with long white hairs; flower 25 cm. long; outer perianth-segments narrow, in 2 or 3 series, brown, or inner series yellowish, acuminate, 8 to 9 cm. long; inner perianth-segments shorter and broader than the outer, pure white, entire, acute; filaments numerous, included; style not projecting beyond the stamens, 17 to 18 cm. long; stigma-lobes linear, about 20; scales on the ovary and tube spreading, 4 to 6 mm. long; fruit not known.

Collected by Dr. J. A. Shafer on Cayo Romano, Cuba, in 1909 (No. 2811).

This species is clearly distinct from *S. boeckmannii*. Both flowered May 2, 1915, in Washington, when decided differences were observed in the color of the hairs on the flower-tube and in the color of the outer perianth-segments.

Figure 278 is from a photograph of a branch of the type plant.

FIG. 278.—Selenicereus brevispinus.

9. Selenicereus boeckmannii (Otto) Britton and Rose, Contr. U. S. Nat. Herb. **12**: 429. 1909.

Cereus boeckmannii Otto in Salm-Dyck, Cact. Hort. Dyck. 1849. 217. 1850.
Cereus irradians Lemaire, Illustr. Hort. **11**: Misc. 74. 1864.
Cereus eriophorus Grisebach, Cat. Pl. Cub. 116. 1866. Not Pfeiffer, 1837.
Cereus vaupelii Weingart, Monatsschr. Kakteenk. **22**: 106. 1912.

Stems light green, 1 to 2 cm. in diameter, strongly angled; ribs 3 to 8, slightly if at all undulating; areoles at first brownish but white in age; spines and hairs in the areoles at first purplish, the spines 3 to 6, becoming yellowish, 2 mm. long or less; flowers not fragrant, 24 to 39 cm. long; outer perianth-segments and scales linear, brownish; inner perianth-segments oblanceolate, 10 cm. long by 3 cm. broad at widest place, pure white; tube and throat 14 cm. long, bearing scattered, short, linear, acute, reddish scales, their axils bearing long brown silky hairs and brown bristles; filaments greenish, long, slender, and weak; style greenish, about 4 mm. in diameter; ovary strongly tuberculate; fruit globular, 5 to 6 cm. in diameter.

Type locality: Not cited.

Distribution: Cuba, Hispaniola, and eastern Mexico; introduced into the Bahamas.

Illustration: Roig, Cact. Fl. Cub. pl. 3, f. 3.

Plate XXXVI, figure 2, shows a specimen collected by J. A. Shafer on Cayo Guayaba, Cuba, in 1909, which flowered in the New York Botanical Garden, May 14, 1913; figure 3 is from a specimen collected in Cuba by Dr. Britton, which flowered and set fruit in 1915.

FIG. 279.—Piece of branch of S. macdonaldiae. ×0.5.

10. Selenicereus macdonaldiae (Hooker) Britton and Rose, Contr. U. S. Nat. Herb. **12**: 430. 1909.

Cereus macdonaldiae Hooker in Curtis's Bot. Mag. **79**: pl. 4707. 1853.

The old stems always terete, 10 to 15 mm. in diameter; younger stems somewhat 5-angled, giving off aërial roots, with rather prominent, flattened tubercles 1 to 5 cm. apart, 2 to 3 mm. high; spines

M. E. Eaton del.

Flower on branch of *Selenicereus coniflorus*.
(Natural size.)

several, 2 mm. long or less; flowers 30 to 34 cm. long; outer perianth-segments and upper scales linear, yellow, the outermost scales red or brownish; inner perianth-segments pure white, 10 mm. long, oblanceolate, 2 to 3 cm. broad at widest point, acute; tube proper 12 cm. long, clothed with small scales bearing brown hairs and spines in their axils; fruit oblong, about 8 cm. long.

FIG. 280.—Selenicereus macdonaldiae.

Type locality: Cited as Honduras.

Distribution: According to Dr. Spegazzini (Anal. Mus. Nac. Buenos Aires III. 4: 484), it is found in Uruguay and Argentina, and he thinks that Maldonado, near Montevideo, is the type locality; we know only plants in cultivation.

Cereus donatii (Schumann, Monatsschr. Kakteenk. 13: 185. 1903), first listed in Haage and Schmidt's Catalogue, seems to belong here.

Cereus grusonianus Weingart (Monatsschr. Kakteenk. 15: 54. 1905) is apparently a race of this species, judging from the description and from small plants at the New York Botanical Garden.

Illustrations: Cact. Journ. 2: 135; Curtis's Bot. Mag. 79: pl. 4707; Fl. Serr. 9: pl. 896, 897; Cassell's Dict. Gard. 1: 194; Monatsschr. Kakteenk. 14: 57, all as *Cereus macdonaldiae;* Contr. U. S. Nat. Herb. 12: pl. 76.

Figure 280 shows a flower of a plant in the collection of the United States Department of Agriculture; figure 279 shows a piece of a branch from a plant in the New York Botanical Garden; figure 281 shows a fruiting branch.

11. Selenicereus hamatus (Scheidweiler) Britton and Rose, Contr. U. S. Nat. Herb. 12: 430. 1909.

Cereus hamatus Scheidweiler, Allg. Gartenz. 5: 371. 1837.
Cereus rostratus Lemaire, Cact. Aliq. Nov. 29. 1838.

FIG. 281.—Selenicereus macdonaldiae.

Stem bright green, long and clambering, the branches strongly 4-angled, rarely 3-angled, about 1.5 cm. thick; areoles with spines and black wool, remote, at the upper edges of knobby projections, these often forming obtuse, deflexed spurs about 1 cm. long; spines on juvenile plants bristle-like, white, on old branches fewer, stouter, brown or black; flower 20 to 25 cm. long; upper scales dark green, tinged with red; outer perianth-segments pale green, narrow, about 8 cm. long; inner perianth-segments broad, white; flower-tube 10 cm. long, 22 mm. in diameter, its areoles long-hairy; filaments, style, and stigma-lobes yellow.

FIG. 282.—Selenicereus hamatus.

Type locality: Mexico.

Distribution: Southern and eastern Mexico.

According to the Index Kewensis *Cereus rostratus* occurs on the island of Antigua, but Dr. Rose was unable to find it there in 1913.

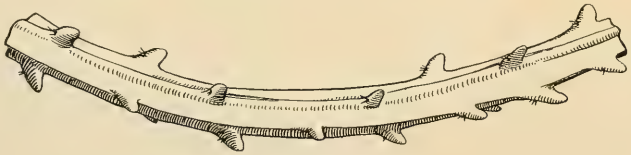

FIG. 283.—Part of branch of S. hamatus. ×0.5.

This species is common in cultivation in greenhouses and is occasionally seen in yards and patios in Mexico. Although we have seen no wild specimens, it seems to be common along the eastern coast of Mexico, probably in the wooded regions.

M. E. Eaton del.

1. Fruit of *Hylocereus trigonus*.
2. Flower of *Selenicereus boeckmannii*
3. Fruit of *Selenicereus boeckmannii*.

(All natural size.)

Illustrations: Monatsschr. Kakteenk. 9: 23; Rep. Mo. Bot. Gard. 16: pl. 11, f. 4, 5; Schumann, Gesamtb. Kakteen Nachtr. f. 7; Blühende Kakteen 3: pl. 161, 162; Wildeman, Icon. Select. 3: pl. 103, all as *Cereus hamatus;* Möllers Deutsche Gärt. Zeit. 14: 340; De Laet, Cat. Gen. f. 30, as *Cereus rostratus;* Rev. Hort. Belge 40: after 184, as *Cereus kostratus;** Bull. Brooklyn Inst. Arts and Sci. 5: 236, 237 (2 figures).

Figure 282 is from a photograph of a flower, taken at the New York Botanical Garden on the evening of October 10, 1910; figure 283 shows a part of a branch.

FIG. 284.—Selenicereus vagans.

12. Selenicereus vagans (K. Brandegee).

Cereus vagans K. Brandegee, Zoe 5: 191. 1904.
Cereus longicaudatus Weber in Gosselin, Bull. Mus. Hist. Nat. Paris 10: 384. 1904.

Stems creeping over rocks, often forming large clumps, more or less rooting, 1 to 1.5 cm. in diameter; ribs about 10, low; areoles 1 to 1.5 cm. apart; spines acicular, numerous, less than 1 cm. long, brownish yellow; flower 15 cm. long; tube, including throat, about 9 cm. long, slightly curved, brownish, with small scattered scales bearing clusters of 5 to 8 acicular spines in their axils; throat narrow, 5 cm. long; outer perianth-segments linear, brownish to greenish white, 6 cm. long; inner

*Doubtless error for *rostratus*.

perianth-segments white, oblanceolate, 6 cm. long, with short acuminate tips, the margins undulate or toothed, especially above; stamens numerous, weak; filaments white or white with greenish bases; style greenish or greenish with cream-colored upper part, slender; stigma-lobes 12, linear; ovary covered with acicular spines.

Type locality: Mazatlan, Mexico.

Distribution: Western coast of Mexico.

Illustration: Pamphlet descriptive of Carnegie Institution of Washington, seventh and eighth issues, p. 23 (reproduced here on p. 239).

Figure 284 shows a flower of a plant which bloomed at the National Botanical Garden, Washington, D. C., in 1905; figure 285*a* shows a tip of shoot and 285*b* a shoot with flower-bud, from specimens grown at the United States Department of Agriculture.

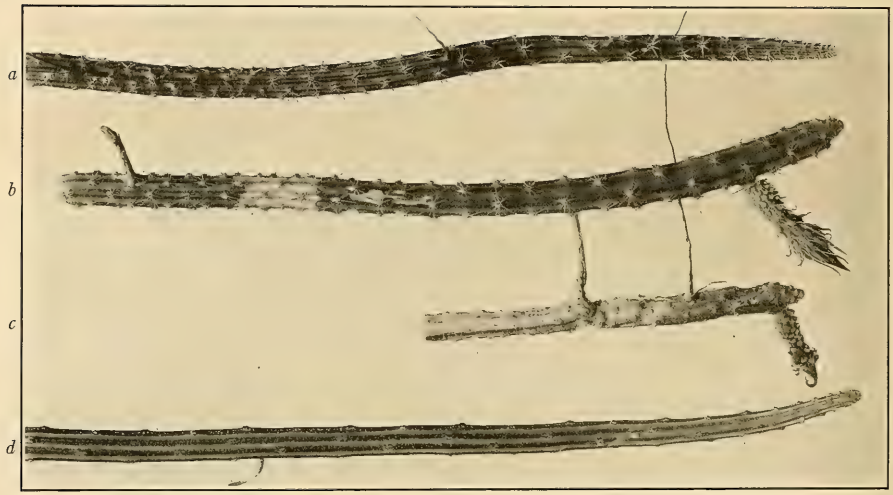

FIG. 285.—*a* and *b*, Selenicereus vagans; *c* and *d*, Selenicereus murrillii. ×0.66.

13. Selenicereus murrillii sp. nov.

A very slender vine, 6 meters long or more, 8 mm. in diameter, freely giving off long slender aërial roots, dark green with the ribs more or less purplish, the scaly leaves at tips of branches minute, pinkish; ribs 7 or 8, low, obtuse, separated by low broad intervals; areoles 1 to 2 cm. apart, small, bearing white wool and minute spines; spines 5 or 6, minute, the two lower ones longer and reflexed, 1 to 2 cm. long; the other spines conic, greenish to black; flower-buds small, oblong, long-acuminate; flower opening at night, 15 cm. long, 15 cm. broad from tip to tip of the outer perianth-segments; tube and throat 6 cm. long, purplish green without, narrowly funnelform, bearing a few slightly elevated areoles, these white-felted and bearing one or two minute spines, the scales on the tube minute but those on the throat lanceolate, 3 to 10 mm. long and widely spreading even on the flower-buds; tube-proper smooth within; throat about 2 cm. long, covered with stamens; outer perianth-segments 12 to 14, greenish yellow or the outer ones purplish on the back, widely spreading, linear to linear-lanceolate, acute; inner perianth-segments pure white except the outermost ones and these greenish, together forming a campanulate corolla; segments broadly spatulate, 4 to 5 cm. long, obtuse; stamens numerous, slender, weak and somewhat declining on the perianth-segments, cream-colored; style slender, weak, cream-colored; stigma-lobes 9, linear, cream-colored; ovary bearing numerous rather large areoles, these white-felted and with 1 to 3 short spines but no long hairs.

Collected by Dr. W. A. Murrill, near Colima, Mexico, in 1910 (No. 31802 N. Y. B. G.). Although we have had it growing in Washington and New York for more than eight years,

we have obtained but one flower. It grows vigorously, giving off many long aërial roots, soon reaching the top of the greenhouses. It has occasionally made small flower-buds, but these soon fall. Toward the last of May 1918, plants in Washington began to develop numerous flower-buds and gave every promise of an abundance of flowers, but a very hot spell occurred the first of June when the thermometer in the greenhouse rose to 114° Fahrenheit, and all the buds but one were killed. The plant, doubtless, needs half-shade conditions. Now that we have studied a mature flower we feel justified in referring this plant to *Selenicereus*, although it does not belong with the typical forms. The flower-bud and flower are similar to those of *S. vagans*. The flower itself in its bell-shaped perianth of short white segments, in its funnel-shaped flower-tube bearing scattered areoles, and in its ovary with short stubby spines resembles very much species of *Acanthocereus* but in habit and other respects it is very different.

Figure 285*c* shows a branch with young flower-buds, 285*d* a terminal shoot.

14. Selenicereus spinulosus (De Candolle) Britton and Rose, Contr. U. S. Nat. Herb. **12**: 431. 1909.

Cereus spinulosus De Candolle, Mém. Mus. Hist. Nat. Paris **17**: 117. 1828.

Stems clambering, 2 to 4 meters long, 1 to 2 cm. in diameter, producing numerous aërial roots, light green, somewhat shining, usually angled but sometimes nearly terete; ribs 4 to 6, or sometimes more; spines very short, yellowish or becoming blackish; radial spines 5 or 6, with 2 reflexed bristles at the base of the areole; central spine 1, rarely 2, on juvenile branches more numerous and more acicular, white; flower 12 to 14 cm. long; its tube about 5 cm. long, with a few clusters of small spines; outer perianth-segments narrowly oblong, 5 to 6 cm. long, acute, spreading; inner perianth-segments pinkish to white, narrowly oblong, acute; stamens white, attached along the inner surface of the throat; stigma-lobes white; ovary covered with clusters of spines similar to those on the tube.

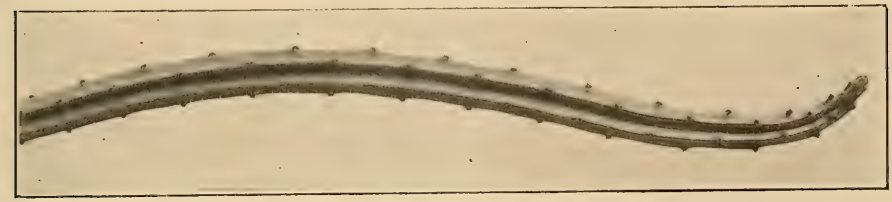

Fig. 286.—Selenicereus spinulosus. ×0.66.

Type locality: Mexico.

Distribution: Eastern Mexico to southeastern Texas.

Illustration: Blühende Kakteen **1**: pl. 53, as *Cereus spinulosus*.

Plate XXXVIII, figure 2, shows a flowering branch of a specimen obtained by Dr. Rose from Texas in 1900, which flowered in the New York Botanical Garden, April 9, 1912. Figure 286 shows a growing shoot from a plant obtained by Dr. E. Palmer at Victoria, Mexico, in 1907.

15. Selenicereus inermis (Otto).

Cereus inermis Otto in Pfeiffer, Enum. Cact. 116. 1837.
Cereus karstenii Salm-Dyck, Cact. Hort. Dyck. 1849. 218. 1850.

Creeping or clambering over rocks and bushes; deep green, the branches 1 to 2.5 cm. thick, 3 to 5-ribbed or angled, the ribs compressed, acute, undulate; old branches naked but young branches bearing setae from the small areoles; areoles remote, sometimes 6 cm. apart, when young each borne on a knob or elevation terminating in a subtending tip or scale; flower just before opening 15 cm. long, with a long acuminate tip, nocturnal; outer perianth-segments linear-oblong, 9 to 10 cm. long, 8 to 10 mm. broad, yellowish green, but more or less purplish at base; inner perianth-segments oblong, 8 to 9 cm. long, pure white except the pinkish bases; filaments numerous, slender, weak, white; style very thick, hollow, 7 mm. in diameter, pinkish, 15 cm. long; stigma-lobes numerous, greenish, 12 mm. long; flower-tube green, 8 cm. long, cylindric, 1.5 cm. in diameter, bearing a few scattered areoles,

these brown-felted and with a cluster of 10 to 15 brown acicular spines, 1 cm. long or less and each subtended by an ovate linear scale; areoles on ovary closely set with clusters of brown acicular spines but no hairs.

Type locality: La Guayra, Venezuela.

Distribution: Venezuela and Colombia.

Flower description drawn from flower opening in the New York Botanical Garden in June 1917, on specimen obtained from M. Simon in Paris, 1905.

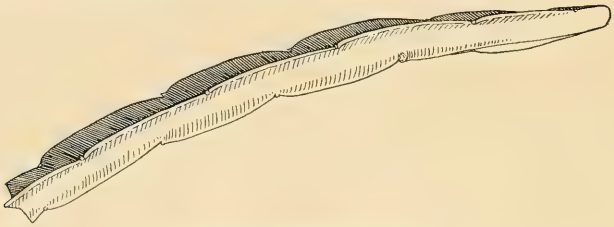

FIG. 287.—Joint of Selenicereus inermis. ×0.5.

Cereus karstenii was sent by Hermann Karsten from Colombia and was described as near *Cereus inermis*, but twice as slender. We find, however, that true *Cereus inermis*, especially in cultivation, becomes elongated and slender. In the Jardin des Plantes, Paris, Dr. Rose found specimens labeled *Cereus karstenii* which proved to be only slender forms of *S. inermis*. In 1916 Dr. Rose collected *S. inermis* at its type locality and obtained fruit of this species for the first time. *C. inermis laetevirens* Salm-Dyck (Cact. Hort. Dyck. 1849. 51. 1850) is only a name.

Figure 287 shows a joint of a plant collected by Dr. Rose between Carácas and La Guayra, Venezuela, in 1916.

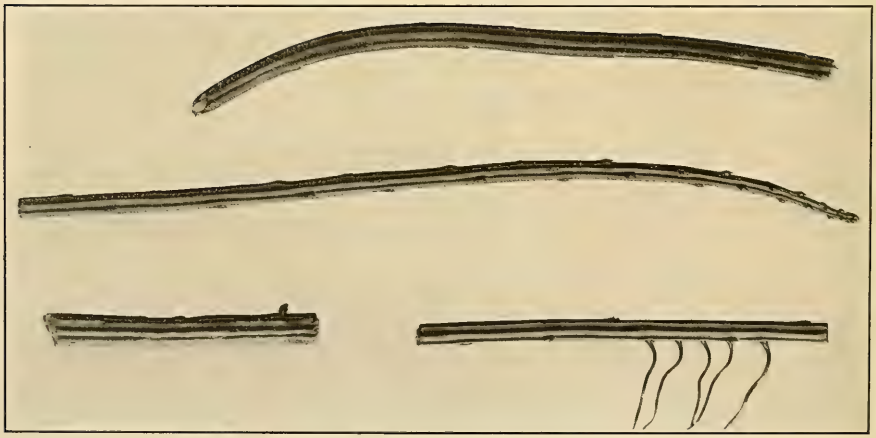

FIG. 288.—Branches of Selenicereus wercklei. ×0.66.

16. Selenicereus wercklei (Weber).

Cereus wercklei Weber, Bull. Mus. Hist. Nat. Paris 8: 460. 1902.

Epiphytic, slender, much branched, freely rooting, the young growth producing small swollen knobs at the areoles tipped by small red scale-like leaves; branches pale green, 5 to 15 cm. in diameter,

nearly terete, with 6 to 12 faint ribs; areoles minute, each bearing a small tuft of felt subtended by a small scale but no spines; flower 15 to 16 cm. long, bright red; outer perianth-segments narrow, greenish, spreading; inner perianth-segments oblong; flower-tube narrow; style green at base, pink in the middle, nearly white above; ovary spiny; fruit ovoid, yellow, bearing clusters of brown spines at the areoles.

FIG. 289.—Flowering plant of Selenicereus wercklei.

Type locality: Cerro Mogote, near Miravalles, Costa Rica.

Distribution: Costa Rica.

It resembles some species of *Rhipsalis* in its epiphytic habit and in its long, slender, naked branches, but not in its flower. In its naked stems, large flowers, and spiny fruit it resembles *S. inermis*, but differs from it in its many low ribs. We have had this plant under observation for a number of years but it has flowered only once. We have seen a second flower which Mr. Otón Jiménez brought us in alcohol from Costa Rica in 1919. He states that even in Costa Rica the plant rarely flowers.

Figure 288 shows branches of *Selenicereus wercklei* from a plant grown in Washington which was sent from Costa Rica by O. Jiménez; figure 289 shows a plant which flowered in the New York Botanical Garden in 1918.

DESCRIBED SPECIES, PERHAPS OF THIS GENUS.

CEREUS ACANTHOSPHAERA Weingart, Monatsschr. Kakteenk. **24**: 81. 1914.

"Dark green, climbing in trees and hanging down, branched at the base; branches uniform, 3 to 7 meters long, with narrow, short, equal, rectangular joints and 4 or 5 compressed-winged ribs; sinuses acute; areoles small, with scanty shining tomentum; spines acicular, 1 to 3, diverging, short, and brownish above; flower unknown; fruit large, round, pendent, yellowish green, pilose and very spiny, crowned by the rotting perigon."

Type locality: On Rio de Santa Maria, State of Vera Cruz, Mexico.

Distribution: Known only from the type locality, and to us only from the description.

It may be a near relative of *Deamia testudo*. In Mexico the two plants are found in the same river valley.

CEREUS HUMILIS De Candolle, Prodr. **3**: 468. 1828.

Plant low, 2.5 cm. in diameter, with spreading, elongated, rooting branches; ribs 4 or 5, strongly compressed, repand; areoles 8 mm. apart, bearing white felt or nearly naked; spines 4 to 8 mm. long; radial spines 8 to 12, setaceous, white; central spines 3 or 4, stouter than the radial, straw-colored.

This species was described by De Candolle in 1828, who stated that the flowers and the country from which it came were unknown. Salm-Dyck had also sent it to him as a new species, under the name of *Cereus gracilis*. In 1837, Pfeiffer redescribed the species, adding the variety *minor* Pfeiffer (Enum. Cact. 115), which latter he described as having fasciculate, slenderer branches and subsetaceous spines. He gave as synonyms of this variety *Cereus mariculi* Hortus and *C. myriacaulon* Martius, sometimes misspelled *nyriacaulon*.

Lemaire in 1839 listed the species and also described the variety *major* Lemaire (Cact. Gen. Nov. Sp. 80. 1839), which he stated to be three times as stout as the species. To the variety he referred *C. rigidus* Lemaire, but this he seems never to have described.

In 1913 Weingart sent Dr. Rose a cutting labeled *Cereus rigidus* which is still growing in the Cactus House of the U. S. Department of Agriculture but it has never flowered. It gives off aërial roots and otherwise looks like a *Selenicereus* but is clearly distinct from any of our described species. The stem is slender, about 8 mm. in diameter, strongly 5-angled; areoles closely set, about 8 mm. apart; spines small, acicular, the centrals a little stouter than the radials, bulbose at base and yellowish brown in color. Weingart's plant proves to be the same as No. 6791 received from M. Simon of St. Ouen, Paris, under the name *Cereus pentagonus*, at the New York Botanical Garden.

Salm-Dyck in 1845 listed the varieties *rigidior* and *myriacaulon*.* The latter name he published in 1850 (Cact. Hort. Dyck. 1849. 22, 222), when he states that the species has short spreading branches about 7.5 cm. long, while the variety is even shorter, slenderer, and often appressed to the ground. He would refer here *Cereus pentalophus radicans* De Candolle (Mém. Mus. Hist. Nat. Paris **17**: 117. 1828).

Several of the West Indian species of *Selenicereus* are known to us to develop very little for long periods after commencing growth; we suspect that the name *Cereus humilis* was based on a plant in that condition.

CEREUS MAYNARDII Paxton, Bot. Mag. **14**: 75. 1847.

Cereus grandiflorus speciosissimus Pfeiffer, Enum. Cact. 113. 1837.
Cereus grandiflorus hybridus Haage in Förster, Handb. Cact. 415. 1846.
Cereus grandiflorus maynardii Paxton, Rev. Hort. III. 1: 285. 1847.
Cereus fulgidus† Hooker in Curtis's Bot. Mag. **96**: pl. 5856. 1870.
Cereus grandiflorus ruber Rümpler in Förster, Handb. Cact. ed. 2. 751. 1885.

Stems bright green, 3 or 4-angled, 3.5 cm. in diameter; spines about 9 in each cluster, acicular, 12 to 18 mm. long, straw-colored, with brown tips; flowers 15 to 18 cm. broad; flower-tube 7.5 to 10 cm. long, bearing small red scales with hairs in their axils; flower parts in several series, scarlet; stamens numerous, shorter than the inner perianth-segments; style elongate; stigma-lobes numerous, linear, white.

This is known to be of hybrid origin, being a cross between *Selenicereus grandiflorus* and *Heliocereus speciosus*.

The publication of the combination *Cereus maynardii* has been only incidental and is attributed to both Paxton and Lemaire. As it is named for Viscountess Maynard, it should have been spelled *maynardae*.

Illustrations: Paxton's Bot. Mag. **14**: pl. opp. 75, as *Cereus grandiflorus maynardi;* Fl. Serr. **3**: pl. 233, 234, as *Cereus grandifloro-speciosissimus maynardii;* Curtis's Bot. Mag. **96**: pl. 5856, as *C. fulgidus;* Deutsche Gärt. Zeit. **9**: 276, as *C. hybridus*.

4. MEDIOCACTUS gen. nov.

A more or less epiphytic cactus, usually growing in trees, with long procumbent branches; branches usually 3-winged, slender, producing aërial roots, the areoles short-spiny; flowers large, funnelform, nocturnal, the tube bearing distant scales; inner perianth-segments white; ovary tuberculate, its felted and spiny areoles subtended by small scales; fruit oblong, red, its areoles felted and spiny.

In habit and flowers this plant much resembles *Hylocereus*, but differs from it in its tuberculate ovary and in the felted and spine-bearing areoles of the fruit, which resemble those of *Selenicereus*.

The genus has 2 species, so far as known to us, the type being *Cereus coccineus* Salm-Dyck. Its name implies intermediate characters as it suggests both *Hylocereus* and *Selenicereus*.

* Walpers (Repert. Bot. 2: 278. 1843) gave this variety as a synonym of this species.
† *Cereus fulgens* (Monatsschr. Kakteenk. 6: 190. 1896) is a misspelling.

Key to Species.

Flowers 25 to 30 cm. long; eastern coast of South America ..... 1. *M. coccineus*
Flowers 38 cm. long; western Andes ..... 2. *M. megalanthus*

1. Mediocactus coccineus (Salm-Dyck).

Cereus coccineus Salm-Dyck in De Candolle, Prodr. 3: 469. 1828.
Cereus setaceus Salm-Dyck in De Candolle, Prodr. 3: 469. 1828
Cereus setaceus viridior Salm-Dyck, Hort. Dyck. 65. 1834.
Cereus lindbergianus Weber in Schumann, Gesamtb. Kakteen 151. 1897.
Cereus lindmanii Weber in Schumann, Gesamtb. Kakteen 163. 1897.
Cereus hassleri Schumann, Monatsschr. Kakteenk. 10: 45. 1900.

Stems usually climbing on trees, sometimes clambering over rocks or walls, developing many aërial roots, the joints pale green, various, sometimes 8 cm. broad, often only 2 cm. broad; angles usually 3, but sometimes 4 or even 5 on the same plant; young areoles 5 to 10 mm. apart, bearing brown felt and 10 to 15 white, radial, deciduous bristles followed by several spines; areoles of mature branches 2 to 3 cm. apart; spines at first pinkish, then brown or yellowish brown, conic, 1 to 2 mm. long, more or less swollen at base, usually only 2 or 3, sometimes more, rarely only 1; flowers 25 to 30 cm. long; outer perianth-segments linear, green, widely spreading; inner perianth-segments erect, broader than outer, upper margins serrate; style exserted, yellow; stigma-lobes about 16, linear, entire, yellow; the fruit somewhat pointed, 7 cm. long, edible, strongly tuberculate when young, its areoles bearing a cluster of spines 1 to 2 cm. long; flesh white; seeds black.

Type locality: Brazil.

Distribution: Argentina to Brazil.

All writers on the *Cactaceae*, including Salm-Dyck, are agreed that the *Cereus coccineus* described by De Candolle (Prodr. 3: 469. 1828) is different from the plant after-

Fig. 290.—Mediocactus coccineus.

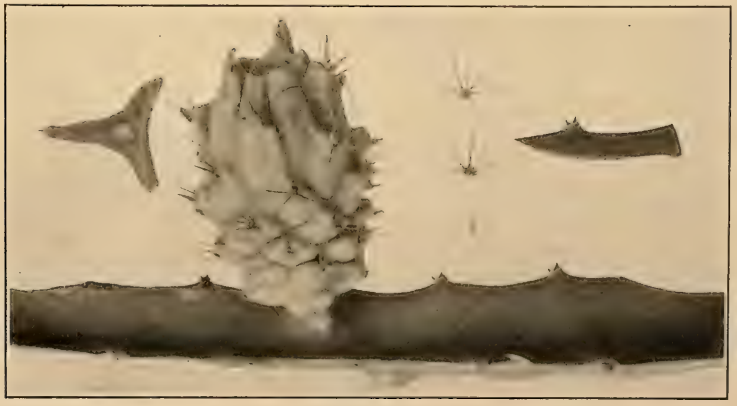

Fig. 291.—Mediocactus coccineus.

wards described by Salm-Dyck under that name. This name of De Candolle has priority of place over *Cereus setaceus* and is, therefore, adopted by us for this well-known plant of eastern South America. The name *coccineus* was evidently given because the flowers were supposed to be red but it would very properly apply to the color of the fruit.

A plant was found growing on a garden wall, half-wild, at Cali, Cauca Valley, Colombia, December 1905, by H. Pittier, but we do not know it to be a native of Colombia.

Cereus prismaticus Salm-Dyck (De Candolle, Prodr. 3:469. 1828. Not Haworth. 1819) is doubtless a *Mediocactus;* if really of South American origin, as stated by Schumann, it is probably *M. coccineus.*

Illustrations: Pfeiffer and Otto, Abbild. Beschr. Cact. 1: pl. 16, as *Cereus setaceus;* Vellozo, Fl. Flum. 5: pl. 24, as *Cactus triangularis.*

Plate XIII, figure 3, shows a fruiting branch and plate XXXVII a flowering branch of plants in the collection of the New York Botanical Garden. Figure 290 is from a photograph taken by Paul G. Russell at Nichteroy, Brazil, in 1915; figure 291 is from a photograph of a branch bearing young fruit collected by H. Pittier from a half-wild plant at Cali, Cauca Valley, Colombia, in 1905, possibly referable to the following species.

2. Mediocactus megalanthus (Schumann).

Cereus megalanthus Schumann, Bot. Jahrb. Engler **40**: 412. 1907.

Growing in trees, forming masses of long pendent branches; branches often only 1.5 cm. broad, rooting freely, 3-angled; margin of angles only slightly undulating; spines 1 to 3, yellowish, 2 to 3 mm. long, when young associated with several white bristles; flowers very large, 38 cm. long, white; inner perianth-segments 11 cm. long, 3.5 cm. broad; stamens numerous; stigma-lobes numerous.

Type locality: Near the town of Tarapoto, Department of Loreto, eastern Peru.

Distribution: Andes of Peru and possibly Colombia and Bolivia.

This species was very briefly described at place cited above and had been previously illustrated (see below). Vaupel (Notizbl. Bot. Gart. Berlin **5**: 284. 1913) has published an extended account which enables us to refer the plant definitely to this genus.

In 1914 Mr. Weingart sent Dr. Rose a cutting of this species but it has grown little since, although it has developed long aërial roots. It was briefly described in a Kew Bulletin (Kew Bull. Misc. Inf. 1914; App. 61. 1914).

The plant seems to have one of the largest flowers known among cacti and, according to Vaupel, is rivaled only by *Selenicereus urbanianus.*

A specimen similar to *Cereus megalanthus* was collected growing in trees by R. S. Williams at Charopampa, Bolivia, September 27, 1901 (No. 881). Mr. Williams says that his plant was many yards in length. It is without flowers or fruit.

Illustration: Karsten and Schenck, Vegetationsbilder **2**: pl. 5, as *Cereus megalanthus.* Figure 292 is a reproduction of the illustration above cited.

5. DEAMIA gen. nov.

An elongated cactus, clambering over or pendent from rocks or climbing and growing on bark of living trees, the joints usually broadly 3-winged, but sometimes 5 to 8-ribbed or winged, clinging by aërial roots; spines of the areoles numerous, acicular, or in juvenile forms bristly; flowers diurnal, very large, the tube slender, elongated; throat funnelform; inner perianth-segments yellowish white; stamens numerous, slender, attached all over the throat; style rather slender; scales on ovary and tube very small, bearing 3 to 5 long brown bristles in their axils; stigma-lobes linear, entire; fruit not known.

A monotypic genus of Mexico, Central America, and Colombia, dedicated to Charles C. Deam, a diligent botanical collector, who sent the plant to us from Guatemala.

M. E. Eaton del.

Flower of *Mediocactus coccineus*. × 0.7.

1. Deamia testudo (Karwinsky).

Cereus testudo Karwinsky in Zuccarini, Abh. Bayer, Akad. Wiss. München **2**: 682. 1837.
Cereus pterogonus Lemaire, Cact. Gen. Nov. Sp. 59. 1839.
Cereus pentapterus Otto in Salm-Dyck, Cact. Hort. Dyck. 1849. 221. 1850.
Cereus miravallensis Weber, Bull. Mus. Hist. Nat. Paris **8**: 459. 1902.
Selenicereus miravallensis Britton and Rose, Contr. U. S. Nat. Herb. **12**: 431. 1909.

Stems and joints various, 3 to 10 cm. broad, or perhaps even more; ribs thin, wing-like, 1 to 3 cm. high; areoles 1 to 2 cm. apart or on juvenile growth much closer together; spines spreading, 10 or more, 1 to 2 cm. long, brownish; flowers 28 cm. long, with a long slender tube 10 cm. long expanding into a broad throat nearly as long as the tube; inner perianth-segments linear-oblong, acuminate, 8 to 10 cm. long; stamens numerous; style slender, long, 24 to 25 cm. long; stigma-lobes linear, numerous; scales on ovary 1 mm. long or less; hairs on ovary and flower-tube brown, 1 to 3 cm. long.

Type locality: Mexico.

Distribution: Southern Mexico to Colombia.

Vaupel (Blühende Kakteen **3**: pl. 150. 1913) doubtfully refers here *Cereus pentagonus* Vellozo, both described and figured by Vellozo (Fl. Flum. **5**: pl. 22. text. ed. Netto 195). Vellozo's plate, however, represents *Cereus pernambucensis*.

This species, although described as *Cereus testudo* in 1837, has long been passing in collections as *Cereus pterogonus*, a later name. It has a rather wide range and there is considerable variation in stems and flowers. It needs more detailed observation than it has yet received.

FIG. 292.—Mediocactus megalanthus.

FIG. 293.—Deamia testudo.

Illustrations: Blühende Kakteen **3**: pl. 150; Curtis's Bot. Mag. **89**: pl. 5360, both as *Cereus pterogonus*.

Figure 293 is from a photograph taken by E. A. Goldman near Carrizal, Vera Cruz, Mexico, in 1901; figure 294 shows branches from a plant sent from Costa Rica in 1911.

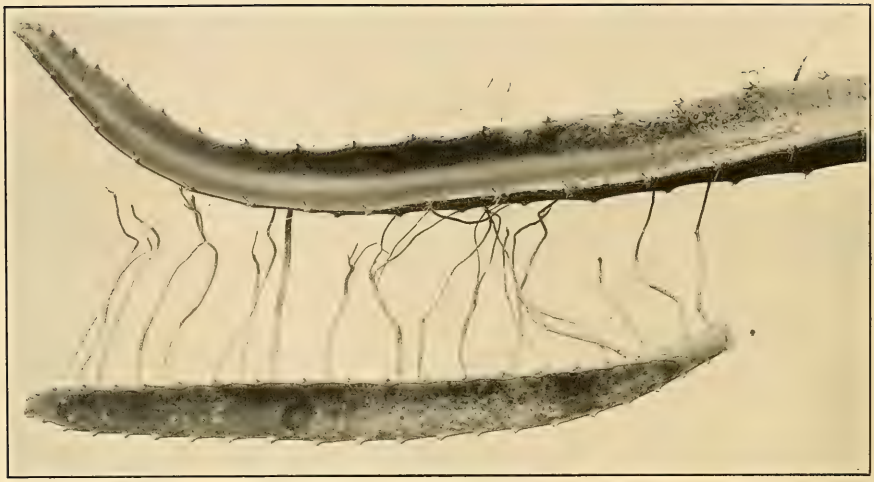

FIG. 294.—Branches of Deamia testudo. ×0.66.

6. **WEBEROCEREUS** Britton and Rose, Contr. U. S. Nat. Herb. **12**: 431. 1909.

Epiphytic cacti, with slender, climbing or hanging stems and branches, these terete, angled or rarely flattened, emitting aërial roots, the areoles bearing a tuft of felt and sometimes several weak acicular bristles or spines; flowers pink, rose-colored or white, nocturnal, short-funnelform or funnelform-campanulate; ovary tuberculate, its areoles bearing weak filiform bristles or stiff hairs, the lower part of the flower-tube with a few similar areoles, the upper part with a few foliaceous scales; outer perianth-segments reflexed-spreading, blunt, linear-oblong, the inner ones narrower; ovary hairy or bristly; areoles of the fruit hairy.

Type species: *Cereus tunilla* Weber.

Three species are here recognized, two from Costa Rica and one from Panama. They are all rather insignificant plants, growing in trees as does *Rhipsalis;* the seedlings and juvenile growths are similar to those of species of that genus, but the large flowers and fruits are quite different.

The genus was named for Dr. Albert Weber (1830–1903) of Paris, who gave much attention to the cacti.

KEY TO SPECIES.

Inner perianth-segments pinkish.
Branches usually strongly angled.....1. *W. tunilla*
Branches terete or slightly angled.....2. *W. biolleyi*
Inner perianth-segments white.....3. *W. panamensis*

1. **Weberocereus tunilla** (Weber) Britton and Rose, Contr. U. S. Nat. Herb. **12**: 432. 1909.

Cereus tunilla Weber, Bull. Mus. Hist. Nat. Paris **8**: 460. 1902.
Cereus gonzalezii Weber, Bull. Mus. Hist. Nat. Paris **8**: 460. 1902.

Stems climbing, 5 to 12 mm. in diameter, usually strongly 4-angled, rarely 2, 3, or 5-angled, but in juvenile forms nearly terete; spines 6 to 12, stiff, swollen at base, yellowish at first, soon brown, 6 to 8 mm. long; flowers 5 to 6 cm. long, pinkish; outer perianth-segments linear, brownish, spreading or reflexed; inner perianth-segments oblong, acute, pink; filaments and style included, pinkish; stigma-lobes whitish; ovary strongly tubercled; tubercles bearing several yellow bristles.

Type locality: Near Tablón, southwest of Cartago, Costa Rica.
Distribution: Costa Rica.
Illustration: Curtis's Bot. Mag. **144**: pl. 8779, as *Cereus tunilla.*

M. E. Eaton del.

1. Fruiting branch of *Selenicereus pteranthus*.
2. Flowering branch of *Selenicereus spinulosus*.
3. Flowering branch of *Weberocereus panamensis*.

(All natural size.)

Plate XXXIX, figure 1, shows a flowering branch of a plant obtained by Wm. R. Maxon in Costa Rica in 1906, which flowered in the New York Botanical Garden in May 1913.

2. **Weberocereus biolleyi** (Weber) Britton and Rose, Contr. U. S. Nat. Herb. 12: 431. 1909.

Rhipsalis biolleyi Weber, Bull. Mus. Hist. Nat. Paris 8: 467. 1902.
Cereus biolleyi Weber in Schumann, Gesamtb. Kakteen Nachtr. 60. 1903.

Branches long, slender, and flexuous, climbing over or hanging from branches of trees, 4 to 6 mm. in diameter, terete or slightly angled, in juvenile plants often flattened or 3-winged, usually spineless but occasionally bearing 1 to 3 yellow spines from an areole; areoles small, remote; flowers 3 to 5 cm. long; all perianth-segments oblong, obtuse, the inner pinkish; ovary tuberculate, hairy.

Type locality: Vicinity of Port Limón, Costa Rica.
Distribution: Costa Rica.

The branches are often only 4 mm. in diameter and spineless. When cuttings are made from these branches queer juvenile forms develop. In one case a flat, thin, 2-edged branch 10 mm. broad was produced with closely set areoles filled with white, bristle-like hairs; from the same cuttings a similar branch was developed, but 3-angled, like a juvenile *Hylocereus*.

Plate XXXIX, figure 2, is from a plant collected at Zent, Costa Rica, by H. Pittier, which flowered in the New York Botanical Garden, July 18, 1913.

3. **Weberocereus panamensis** sp. nov.

Stems 1 to 2 cm. broad, strongly 3-angled or some joints flat; margins acute, indented; areoles small, each hidden beneath a small thick scale, sometimes bearing 1 to 3 short weak spines; flower 4 to 7 cm. long; outer perianth-segments and inner scales yellowish green, erect; inner perianth-segments white, oblong; tube proper smooth and white within; throat 1 cm. long; stamens included; filaments white, a part attached to the lower face of the throat and a part to the upper margin; style white, included; stigma-lobes white (in wild state said to be purple); ovary tuberculate, green, with spreading scales, each subtending 4 to 8 long white hairs; fruit red, 2 to 3 cm. in diameter, tubercled, at least when young.

FIG. 295.—Weberocereus panamensis.

Collected in forest thickets along the Rio Fato, Province of Colon, Panama, July 1911, by H. Pittier (No. 3903) and flowered first in Washington in 1913.

Plate XXXVIII, figure 3, is from the type specimen, which flowered in the New York Botanical Garden, September 20, 1915. Figure 295 shows a fruiting branch collected by Mrs. D. D. Gaillard at Lake Gatun, Panama, in 1913.

PUBLISHED SPECIES, KNOWN TO US ONLY FROM DESCRIPTION.

Cereus estrellensis Weber (Monatsschr. Kakteenk. **15**: 167. 1905) is, according to C. Wercklé, similar to *Cereus nycticallus* but weaker and more spiny. The stems are 6-angled; the flowers are small, rosy to salmon-colored, and nocturnal. It is of Costa Rican origin, but is known to us only from this brief characterization and may belong to our genus *Weberocereus*.

7. **WERCKLEOCEREUS** Britton and Rose, Contr. U. S. Nat. Herb. **12**: 432. 1909.

Epiphytic, climbing cacti, the 3-angled branches emitting aërial roots, their areoles bearing short bristles or very weak spines and a tuft of felt; flowers short-funnelform, the tube rather stout; ovary and flower-tube bearing many areoles, each with several nearly black, acicular spines and a tuft of short black felt, subtended by minute scales; outer perianth-segments lanceolate, acutish, narrow; inner perianth-segments broader; stamens many; style about as long as the longer stamens, with several linear stigma-lobes; berry globose, its areoles spiny.

Two species are known, 1 in Costa Rica and 1 in Guatemala; both are in cultivation. The genus is dedicated to C. Wercklé, a Costa Rican collector.

Type species: *Cereus tonduzii* Weber.

In habit the plants resemble species of *Hylocereus*, but the flowers are very different.

KEY TO SPECIES.

Flowers 8 cm. long or less; stem-areoles at most bristly.....1. *W. tonduzii*
Flowers 10 cm. long or more; stem-areoles with weak but definite spines.....2. *W. glaber*

1. **Werckleocereus tonduzii** (Weber) Britton and Rose, Contr. U. S. Nat. Herb. **12**: 432. 1909.

Cereus tonduzii Weber, Bull. Mus. Hist. Nat. Paris **8**: 459. 1902.

Stems rather stout, bushy-branched, the joints 3-angled, rarely 4-angled, deep green, not at all glaucous, climbing by aërial roots; margins of ribs nearly straight; areoles small, felted, without spines, but sometimes with weak bristles; flowers 8 cm. long or less, areoles of the ovary and tube bearing clusters of dark spines and short black wool; outer perianth-segments brownish, oblong, 1 to 2 cm. long; inner perianth-segments oblong, creamy white, 2.5 cm. long; stamens exserted; style longer than the stamens; berry globose, citron-yellow, its apex umbilicate, its flesh white.

Type locality: Copey, near Santa Maria de Dota, Costa Rica.

Distribution: Costa Rica.

In greenhouse cultivation some plants are remarkably floriferous and very conspicuous when in bloom.

Plate XXXIX, figure 3, shows part of a plant which flowered in the New York Botanical Garden, March 30, 1908. Figure 296 is from a photograph of a plant in the same collection.

2. **Werckleocereus glaber** (Eichlam) Britton and Rose, Addisonia **2**: 13. 1917.

Cereus glaber Eichlam, Monatsschr. Kakteenk. **20**: 150. 1910.

Stems slender, 3-angled, about 2 cm. broad, pale green and slightly glaucous, climbing by aërial roots; margins somewhat knobby, the areole borne on the upper part of the knob, small, 3 to 4 cm. apart; spines 2 to 4, short, 1 to 3 mm. long, acicular, but with swollen bases; flower 10 cm. long or more, the ovary and tube bearing clusters of yellow to brown acicular spines; inner perianth-segments white, oblanceolate, acute, somewhat serrate; style pale yellow, weak, resting on the under side of the flower-tube; stigma-lobes white; fruit not known.

Type locality: Western coast of Guatemala.

Distribution: Guatemala.

In habit this species much resembles *Wilmattea minutiflora*, also from Guatemala, but its flower characters are quite different.

Illustration: Addisonia **2**: pl. 47.

Plate XXXIX, figure 4, is from a specimen obtained by Dr. Rose from Guatemala, which flowered in the New York Botanical Garden, April 14, 1915.

1. Flowering branch of *Weberocereus tunilla*.
2. Flowering branch of *Weberocereus biolleyi*.
3. Flowering branch of *Werckleocereus tonduzii*.
4. A flower of *Werckleocereus glaber*.

(All natural size.)

Fig. 296.—Werckleocereus tonduzii.

8. **APOROCACTUS** Lemaire, Illustr. Hort. 7: Misc. 67. 1860.

Slender, vine-like cacti, creeping or clambering, sending out aërial roots freely, day-blooming; flowers rather small, one at an areole, funnelform, pink to red, the tube nearly straight, or bent just above the ovary, the limb somewhat oblique; outer perianth-segments linear, spreading or recurved, scattered; inner perianth-segments broad, more compact than the outer perianth-segments; stamens exserted, in a single, somewhat 1-sided cluster; filaments attached all along the throat; tube proper about the length of the narrow throat; fruit globose, small, reddish, setose; seeds few, reddish brown, obovate.

We recognize 5 species, the typical one being *Cactus flagelliformis* Linnaeus.

This genus, first described by Lemaire, included not only the typical *A. flagelliformis*, but also *Cereus baumannii* and *C. colubrinus*, but the next year he withdrew the last two species. The name has never come into very general use, in spite of the good generic characters. The geographical distribution of the genus is uncertain. Three of the species are known to grow wild in Mexico, while *A. flagelliformis*, also common in Mexico, was very early introduced into Europe as from South America.

The name is from the Greek, signifying impenetrable cactus, of no obvious application.

Key to Species.

Flowers strongly bent just above the ovary.
- Branches very slender; ribs 7 or 8 ..... 1. *A. leptophis*
- Branches stouter; ribs 10 to 12.
  - Outer perianth-segments narrow; inner perianth-segments apiculate ..... 2. *A. flagelliformis*
  - Outer perianth-segments oblong; inner perianth-segments acuminate ..... 3. *A. flagriformis*

Flowers nearly straight.
- Inner perianth-segments acute ..... 4. *A. conzattii*
- Inner perianth-segments acuminate ..... 5. *A. martianus*

1. **Aporocactus leptophis** (De Candolle) Britton and Rose, Contr. U. S. Nat. Herb. **12**: 435. 1909.

Cereus leptophis De Candolle, Mém. Mus. Hist. Nat. Paris **17**: 117. 1828.
Cereus flagelliformis leptophis Schumann, Gesamtb. Kakteen 143. 1897.

Often creeping; branches cylindric, 8 to 10 mm. thick, rather strongly 7 or 8-ribbed; ribs obtuse, somewhat repand; areoles velvety, with 12 or 13 rigid setaceous spines; flower-tube curved just above the ovary; perianth-segments narrowly oblong, 2 to 3 cm. long, about 6 mm. wide.

Type locality: Mexico.

Distribution: Mexico.

Illustrations: De Candolle, Mém. Cact. pl. 12; Förster, Handb. Cact. ed. 2. f. 96; Rümpler, Sukkulenten f. 68, all as *Cereus leptophis*.

Plate XL, figure 1, shows a flowering plant in the collection of the New York Botanical Garden. Figure 297 is reproduced from the first illustration above cited.

2. **Aporocactus flagelliformis** (Linnaeus) Lemaire, Illustr. Hort. **7**: Misc. 68. 1860.

Cactus flagelliformis Linnaeus, Sp. Pl. 467. 1753.
Cereus flagelliformis Miller, Gard. Dict. ed. 8. No. 12. 1768.
Cereus flagelliformis minor Salm-Dyck in Pfeiffer, Enum. Cact. 111. 1837.*

Stems at first ascending or erect, but weak and slender or pendent, 1 to 2 cm. in diameter; branches often prostrate and creeping or even pendent; ribs 10 to 12, low and inconspicuous, a little tuberculate; areoles 6 to 8 mm. apart; radial spines 8 to 12, acicular, reddish brown; central spines 3 or 4, brownish with yellow tips; flowers 7 to 8 cm. long, opening for 3 or 4 days, crimson; outer perianth-segments narrow, more or less reflexed; inner perianth-segments broader, only slightly spreading; fruit globose, small, 10 to 12 mm. in diameter, red, bristly; pulp yellowish.

Type locality: At first supposed to be from South America.

Distribution: Reported from Mexico, Central America, and South America; nowhere known to us in the wild state.

Said to have been introduced from Peru in 1690, but, presumably, originally from Mexico. The species is widely cultivated in all tropical countries. It is very common in Mexico to see this plant about the houses of the poorer Mexicans, often planted in the end of a cow's horn and hung on the side of the house. This species, too, has cristate forms.

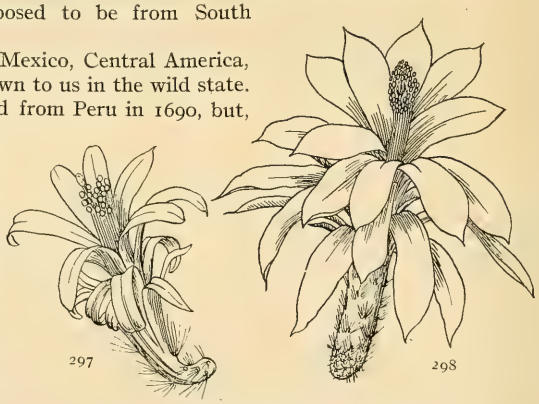

FIG. 297.—Flower of Aporocactus leptophis.
FIG. 298.—Flower of Aporocactus flagriformis.

The plant is known as the rat-tail cactus and is much grown as a window plant. In Mexico the dried flowers are used as a household remedy and sometimes are sold in the drug markets under the name of flor de cuerno.

This species is recorded by Grisebach, citing Sloane and Swartz, as found in trees, in Jamaica along the coast, but it is not known to occur on that island at the present time. Sloane's description better applies to *Selenicereus grandiflorus*.

Cereus smithii Pfeiffer (Enum. Cact. 111. 1837) is a generic hybrid produced by adding the pollen of this species to one of the species of *Heliocereus* and was made by an English gardener, Mr. Mallison. It is figured in Curtis's Botanical Magazine for 1841 (**67**: pl. 3822) and in Edwards's Botantical Register (**19**: pl. 1565) and it was said to be one of the best hybrids which had yet been produced. The flower is nearly regular with scarcely any

Cereus minor* (Weingart, Monatsschr. Kakteenk. **18: 49. 1908) doubtless refers to the variety *minor* given above.

M. E. Eaton del.
A. A. Newton Del.

1. Flowering plant of *Aporocactus leptophis*.
2. Flowering plant of *Aporocactus flagelliformis*.
(Natural size.)

tube and with nearly erect filaments; the stem is weak and creeping, with about 6 angles; it is somewhat stouter than is *Aporocactus flagelliformis*. *Cereus mallisonii** (Pfeiffer, Enum. Cact. 111. 1837), *C. flagelliformis mallisonii* (Walpers, Repert. Bot. 2: 278. 1843), and *C. flagelliformis smithii* (Walpers, Repert. Bot. 2: 278. 1843) are other names for this same hybrid and this must also be *C. flagelliformis speciosus* Salm-Dyck (Cact. Hort. Dyck. 1849. 50. 1850) since it is based on the same illustration. While botanists generally refer the name, as we have above, to Pfeiffer, it was fully described and figured by Link and Otto (Verh. Ver. Beförd. Gartenb. 12: 134. pl. 1. 1837). While they announce that their plant was obtained by Mallison, as we state above, their illustration shows a very different flower from the one figured in the Botanical Register and suggests that it was from a different plant, although doubtless produced from the same parents. The flower differs from the other not only in its color but also in its narrower, more elongated tube. *Cereus crimsonii* (Pritzel, Icones 246. 1855) was also based on the plate in the Botanical Register (19: pl. 1565. 1833) and must represent this same hybrid.

Cereus aurora (Monatsschr. Kakteenk. 16: 81. 1906) is also of hybrid origin. According to E. Golz, one of its parents is some species of *Echinopsis*.

Cereus ruferi and *C. ruferi major* (Monatsschr. Kakteenk. 16: 10. 1906) are said to be hybrids of which *C. flagelliformis* is one of the parents.

Cereus moennighoffii Fischer (Monatsschr. Kakteenk. 15: 143. 1905) is a hybrid between this species and *C. martianus*. Other hybrids with *Cereus martianus* and *Epiphyllum ackermannii* have been reported.

Cereus vulcan (Monatsschr. Kakteenk. 16: 10. 1906) is a hybrid of *A. flagelliformis;* its other parent is unknown. It is illustrated by Rümpler (Sukkulenten f. 67).

There are several unpublished names which are referred to this species, among which are varieties *funkii*, *nothus*, *scotii*, and *smithii*, all in Walpers (Repert. Bot. 2: 278. 1843).

Illustrations: Safford, Ann. Rep. Smiths. Inst. 1908: f. 18; Stand. Cycl. Hort. Bailey 1: f. 237. Curtis's Bot. Mag. 1: pl. 17; De Candolle, Pl. Succ. Hist. 2: pl. 127; DeTussac, Fl. Antill. 2: pl. 28; Mag. Bot. and Gard. Brit. and For. 1: pl. 14, f. 4; Loudon, Encycl. Pl. f. 6875, as *Cactus flagelliformis;* Baillon, Hist. Pl. 9: f. 52, 53; Cact. Journ. 1: 10; Förster, Handb. Cact. ed. 2. f. 5; Martius, Fl. Bras. 4^2: pl. 41, f. 2, all as *Cereus flagelliformis;* Rümpler, Sukkulenten f. 66, as *Cereus flagelliformis minor;* Trew, Pl. Select. pl. 30, as *Cereus*.

Plate XL, figure 2, shows a flowering plant in the collection of the United States Department of Agriculture.

3. Aporocactus flagriformis (Zuccarini) Lemaire in Britton and Rose, Contr. U. S. Nat. Herb. 12: 435. 1909.

Cereus flagriformis Zuccarini in Pfeiffer, Enum. Cact. 111. 1837.

At first erect and rather stout, afterwards creeping and very much branched; branches green, 10 to 24 mm. in diameter; ribs 11, very low, obtuse, somewhat tuberculate; areoles small, 4 to 6 mm. apart; radial spines 6 to 8, 4 mm. long, acicular, horn-colored; central spines 4 or 5, shorter than the radials but stouter, brown; flowers dark crimson, 10 cm. long, 7.5 cm. broad or more; flower-tube 3 cm. long or more; perianth-segments in 3 series, the series well separated; inner perianth-segments oblong, 10 mm. broad, acuminate; stamens red, erect, exserted; stigma-lobes 6, white.

Type locality: San José de l'Oro, Oaxaca, Mexico.

Distribution: Mexico.

This species seems not to have appeared in collections for a long time. As the type locality is known one would suppose it might have been reintroduced. We have repeatedly tried to have it re-collected but so far have failed; in putting forth this effort we have succeeded in discovering another species which is described below as new.

The binominal *A. flagriformis* appeared in Lemaire, Les Cactées, page 58, 1868, but it is not formally published at that place.

Cactus mallisonii is credited by the Index Kewensis to Loudon's Encyclopedia (Suppl. 1. 1202. 1840), but it appears there under *Cereus*.

Illustrations: Pfeiffer and Otto, Abbild. Beschr. Cact. 1: pl. 12; Engler and Prantl, Pflanzenfam. 3[6a]: f. 58, both as *Cereus flagriformis*.

Figure 298 is copied from the first illustration above cited.

4. **Aporocactus conzattii** sp. nov.

Creeping, clambering, or hanging from a support, developing aërial roots here and there; stems 12 to 25 mm. in diameter; ribs 8 to 10, rather prominent, low-tuberculate; aeroles 3 to 4 mm. apart; spines 15 to 20, acicular, light brown, unequal, the longest 12 mm. long; buds nearly erect, covered with brown acicular spines or bristles; flowers 8 to 9 cm. long; tube nearly straight, red, bearing a few ovate scales, their axils short-woolly and with a few bristle-like spines; limb slightly oblique, with a wide mouth; upper inner perianth-segments arching forward, the lower ones somewhat reflexed, all narrow, 6 to 7 mm. broad, acute, brick-red; stamens and style shorter than the perianth-segments but exserted from the throat of the flower, long, connivent, nearly white; style slender, stiff, white, nearly 6 cm. long, not extending beyond the filaments; tube proper 2 to 2.5 cm. long; throat about 1 cm. long, narrow, bearing stamens all over its surface; filaments numerous, white; flower open for 2 days, remaining open at night.

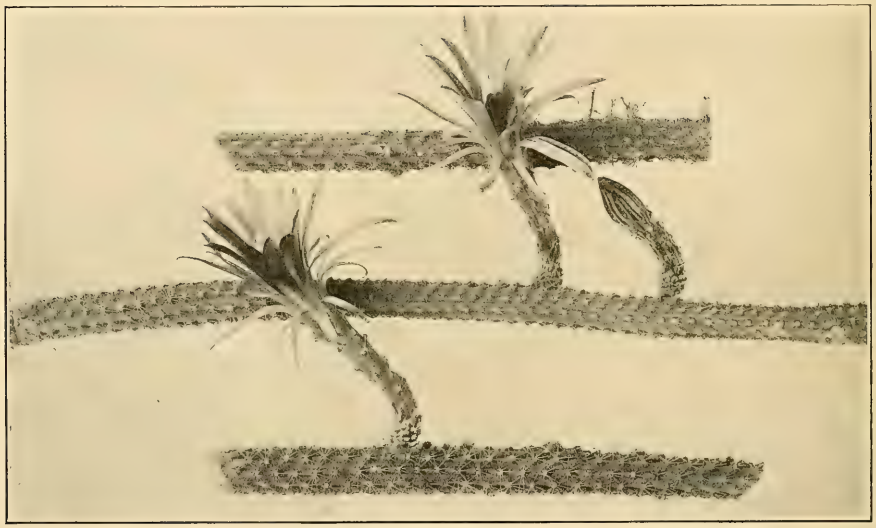

Fig. 299.—Aporocactus conzattii. ×0.66.

Collected by Professor C. Conzatti in 1912 on Cerro San Felipe, Oaxaca, Mexico, and flowered in Washington, first on February 17, 1916, and again in 1917.

This species is near *Aporocactus martianus*, but the inner perianth-segments are not long-acuminate, and the flowers are smaller (at least than those shown in Hooker's illustration). It is a very valuable introduction for greenhouse culture.

Figure 299 is from a photograph of the type plant which flowered in Washington, in 1918; figure 300 shows a flower of the same.

5. **Aporocactus martianus** (Zuccarini).

Cereus martianus Zuccarini, Flora 15[2]: Beibl. 66. 1832.
Eriocereus martianus Riccobono, Boll. R. Ort. Bot. Palermo 8: 240. 1909.

Stems rather stout, somewhat branched, 15 to 18 mm. in diameter; ribs about 8, low, obtuse; areoles 12 mm. apart; spines 6 to 8, acicular to bristle-like; flowers a deep rose-color, 8 to 10 cm. long; outer perianth-segments narrowly lanceolate, acuminate; inner perianth-segments similar but long-acuminate; style long exserted; fruit globular, 2 cm. in diameter, greenish, spiny.

Type locality: Mexico.

Distribution: Central Mexico.

This species is usually associated with *Aporocactus flagelliformis*, but, owing to its more regular flower, Berger was disposed to refer it elsewhere. It is known to us only from description and illustrations.

Illustrations: Blühende Kakteen **2**: pl. 65; Curtis's Bot. Mag. **66**: pl. 3768; Monatsschr. Kakteenk. **9**: 105; Rep. Mo. Bot. Gard. **16**: pl. 12, f. 1, as *Cereus martianus*.

Figure 301 is copied from Curtis's Botanical Magazine plate 3768.

FIG. 300.—Flower of Aporocactus conzattii.
FIG. 301.—Flower of Aporocactus martianus.

The following description is based on a plant of this relationship, but it differs from figured specimens in the broader perianth-segments, shorter flower-tube, and red filaments. It was obtained from the Theodosia B. Shepherd Company, Ventura, California, and flowered in Washington, D. C., in 1916.

Ribs 5 to 7, separated by broad intervals, somewhat undulate; areoles about 1 cm. apart, circular, bearing white wool and spines; spines about 10, acicular, yellow; flower-bud acute; flowers dark red, 9 cm. long, the tube shorter than the limb; tube-proper about 2 cm. long; throat 1.5 cm. long; scales on the ovary numerous, narrow, their axils with white wool and clusters of spines; axils of upper scales naked; outer perianth-segments narrow, acute; inner perianth-segments broadly lanceolate, 1.5 cm. broad, acute, carmine; stamens erect, not quite as long as the inner perianth-segments; filaments carmine; style carmine, weak, about as long as the filaments; stigma-lobes white; fruit not known.

The only flower seen opened in the early morning and was still open at half-past one.

9. STROPHOCACTUS Britton and Rose, Contr. U. S. Nat. Herb. **16**: 262. 1913.

As epiphytic cactus, the stems twining and climbing by aërial roots emitted along the midnerve, thin, broad, flat, somewhat branching, the margins bearing numerous closely-set areoles; spines numerous, acicular; flowers large, red, narrowly funnelform, nocturnal; ovary and flower-tube with numerous hairs and bristles in the axils of the scales; perianth cutting off from the ovary as in *Cereus;* fruit ovoid, with a truncate apex, its areoles bristly; seeds black, ear-shaped, with an open hilum.

Mr. Berger proposed a subgenus *Phyllocereus* for this plant, supposing it represented a connecting link between *Phyllocactus* and *Cereus*. Its flat stems are like those of *Epiphyllum;* its flower is most like that of *Selenicereus*. Berger's name, while appropriate, could not be used because of the *Phyllocereus* Miquel (Bull. Sci. Phys. Nat. Neerl. 112. 1839). The name is from the Greek, referring to the twisting or turning of the stem about trees.

A monotypic genus of the Amazonian forests, still rare in collections.

1. Strophocactus wittii (Schumann) Britton and Rose, Contr. U. S. Nat. Herb. **16**: 262. 1913.

. *Cereus wittii* Schumann, Monatsschr. Kakteenk. **10**: 154. 1900.

A thin, very flat plant, often 1 dm. broad, growing appressed to trunk of trees; joints broad, leaf-like, 3 or 4 times as long as broad, rounded at base and apex, with a stout central vein and nearly entire margin; areoles small, closely set along the margin of the joints, 6 to 8 mm. apart, bearing tufts of wool and bristles besides the spines; spines numerous, acicular, yellowish brown, 12 mm. long or less; flowers elongated, large, 25 cm. long; tube elongated, tapering upward, only about half

as thick at top as at base; limb short; outer perianth-segments linear, about 10, nearly twice as long as the inner ones; inner perianth-segments narrowly oblanceolate, acute or acuminate; filaments not extending beyond the inner perianth-segments; limb short; fruit 2.5 to 3.5 cm. long, spiny.

Type locality: In the swampy woods near Manaos, Brazil.

Distribution: Very abundant and widely distributed in the swampy forests of the Amazon, Brazil.

We have in our collection a part of the type material.

The following account of this very remarkable plant is from the pen of Karl Schumann and was published in the Gardeners' Chronicle in 1901 p. 78:

"Among the numerous novelties which the last decade of the past century brought to Europe, the above named is surely one of the most interesting for both the amateur and the professional cultivator. I received this curious plant through the kindness of Mr. N. H. Witt, of Manaos, Erlado do Amazonas, Brazil. He told me long before he was able to send specimens that a climbing species of a genus he was not able to determine, grew in the swampy forest, or Igape, on the Amazon river. Closely appressed to the stems of the trees, and fixed to them by numerous roots, in the region of the yearly inundation, there creeps a cactus with the habit of a *Phyllocactus*, but armed with very sharp spines. It is so closely connected with the plant on which it grows that one must look carefully to distinguish it.

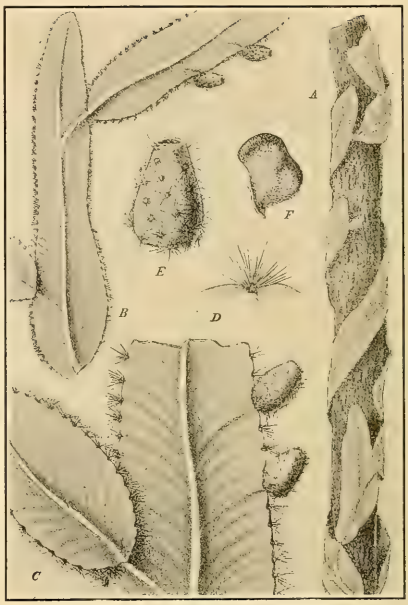

FIG. 302.—Strophocactus wittii.

"When I had the specimen in my hand after it was taken out, I did not at all know how to class it. I was not able even to indicate the genus. It could not belong to *Phyllocactus*, however much the form of the leaf-like joints suggested that genus. Perhaps it might be a very abnormal species of *Rhipsalis*, but the flowers or fruits being absent, the question could not be answered.

"Last autumn I was fortunate enough to get, by the aid of Mr. N. H. Witt, plentiful specimens of the plant. After having carefully examined it, I found two fruits of ovoid form as large as a pigeon's egg, beset with very sharp prickles. This organ had all the characteristics of the genus *Cereus*, and I could now name the species, and did so in honour of the finder, *Cereus wittii*. The species is very interesting, because it is the 'missing link' between the genera *Phyllocactus* and *Cereus*. The form of the joints is perfectly typical of the former; the characteristics of the fruits and spines are those of a *Cereus*.

"Some days ago I received a notice from Dr. E. Ule, a botanist, whom I had sent from Manaos to the river Furnà, a tributary stream on the right side of the Amazon—that he had found a peculiar cactus in the upper part of the swampy forest, densely appressed to the tree-stems. His further description of the plant informed us that *C. wittii* is widely distributed. He told me that the older joints of *C. wittii* turn from green to a beautiful wine-red or purple colour, a peculiarity which I had also seen on the plants we cultivate in the Royal Botanic Garden of Berlin."

Illustrations: Gard. Chron. III. 29: f. 17; Monatsschr. Kakteenk. 10: 155; 12: 139; 15: 25; Schumann, Gesamtb. Kakteen Nachtr. f. 6, all as *Cereus wittii*; Contr. U. S. Nat. Herb. 16: pl. 84.

Figure 302 is a copy of the plate above cited (Monatsschr. Kakteenk. 10: 155)

APPENDIX.

We bring together here records of some species described in Germany during the war period, 1916–1918, cited from periodicals only recently received in the United States, together with a few supplementary observations upon other species described in this volume.

Cereus hexagonus. (See page 4, *ante*.)

Dr. Britton has recently studied this species on the western mainland of Trinidad and the small islands, Gasparee, Monos, and Chacachacare, adjacent. Here it inhabits rocky hillsides, attaining a height up to 15 meters; planted individuals observed were considerably taller. At St. Joseph large numbers of young plants up to 4 meters tall were seen growing upon branches of saman trees, evidently germinated from seeds carried by birds from the fruit of large planted specimens nearby, an interesting illustration of induced epiphytic habit of a typically saxicolous plant. Repeated field observations showed that this *Cereus* is usually 4-ridged when young, becoming 6-ridged later in life, many plants bearing some joints 4-ridged, some 6-ridged.

Illustration: Loudon, Encycl. Pl. 410. f. 6854, as *Cactus hexagonus*.

Cereus chalybaeus. (See page 16, *ante*.)

Cereus beysiegelii (Monatsschr. Kakteenk. 29: 48. 1919) is an abnormal form, similar to *Cereus peruvianus monstruosus*, which Mr. W. Weingart says looks like *Cereus chalybaeus* on account of its black spines and turquoise-green skin. Its origin is unknown.

FIG. 303.—Cereus grenadensis.

FIG. 304.—Section of flowering branch of C. grenadensis.

23. Cereus grenadensis sp. nov. (See page 18, *ante*.)

Tall, much branched, up to 7 meters high, the trunk short, sometimes 2.5 dm. in diameter, the branches grayish green, erect-ascending, about 7 cm. in diameter, 7 to 9-ribbed, the ribs about 1 cm. high, transversely grooved above each areole; areoles about 1 cm. apart, borne in slight depressions of the ribs, gray-pulverulent; spines about 17, subulate, straight, brownish or gray, the largest about 2 cm. long, the shortest about 3 mm, the central one often twice as long as any of the others; flowers many, borne towards the ends of the branches, about 7 cm. long, short-funnelform, open in the early morning, the buds rounded; outer perianth-segments with broad purple rounded or apiculate tips, the few inner ones rounded, purplish; ovary oblong, with a few naked areoles; stamens many, not exserted; immature fruit green, ellipsoid, 3 to 4 cm. long.

Collected on island of Grenada, British West Indies, by N. L. Britton and T. E. Hazen, February 24, 1920. Type from a slope on the harbor of St. George's.

As observed on the date of collection, this cactus is abundant about the harbor of St. George's and a conspicuous element of the vegetation; it was also studied on hills elsewhere in the southern part of the island, but only the type plant was seen in bloom. The species is closely related to *Cereus repandus* Miller of Curaçao, differing in its shorter spines, somewhat smaller, purple flowers, continuous unconstricted branches and transversely grooved ribs, and also to *Cereus margaritensis* Johnston of Margarita, from which it differs by straight spines, somewhat larger flowers, and grooved ribs. The fruit was said by negroes to be edible when ripe. It is called dildo, a common West Indian name for the tall-branching, cereus-like cacti.

Figure 303 shows the type plant; figure 304 shows one of its branches photographed by T. E. Hazen.

Cereus. (See page 21, *ante*.)

Cephalocereus californicus Hortus is credited by the Index Kewensis to Schumann (Engler and Prantl, Pflanzenfam. 3[6a]: 182. 1894), although it is not quite certain whether Schumann intended to list this name under *Cephalocereus* or as *Cereus californicus*. The *Cereus californicus* Nuttall we have already referred to *Opuntia serpentina* (see 1: 58, *ante*).

Cereus chlorocarpus De Candolle (Prodr. 3: 466. 1828; *Cactus chlorocarpus* Humboldt, Bonpland, and Kunth, Nov. Gen. et Sp. 6: 67. 1823) which originally came from the Peruvian and Ecuadorean boundary has not been identified. It is evidently not a true *Cereus*.

Cereus columnaris Loddiges (Voigt, Hort. Suburb. Calcutt. 61. 1845) is said to have been introduced into suburbs of Calcutta in 1840. Otherwise it is unknown. This name may apply to *Cereus hexagonus* (L.) Miller.

Cereus flavispinus hexagonus Salm-Dyck (Hort. Dyck. 63. 1834) is only a name.

Cereus geminisetus Reichenbach (Terscheck, Suppl. Cact. Verz. 3) we know only from Walpers's (Repert. Bot. 2: 340. 1843) brief description of a sterile plant of unknown origin.

Cereus heteracanthus Tweedie (Sweet, Hort. Brit. ed. 3. 284. 1839) was described simply as a variable-spined *Cereus*.

Cereus ictidurus (Hort. Univ. 1: 224. 1839), called the martin's-tail-cereus, reported as soon to be figured and described, we do not know.

Cereus zizkaanus or *C. ziczkaanus* (Montasschr. Kakteenk. 5: 44. 1895) is figured in the Gardeners' Chronicle for 1873 (75. f. 15) where it is referred to *Cereus eburneus* with a question. It is said to have come from Gruson's garden. This is doubtless the same as *Cereus chilensis zizkaanus*, sometimes spelled *zizkeanus* (see page 137, *ante*).

Pilocereus pfeifferi, sometimes credited to Otto, occurs frequently in German cactus works, but we have seen no description. The name is not found in the Index Kewensis or in Schumann's Monograph. Dr. Rose saw a living specimen in the Berlin Botanical Garden labeled "*Pilocereus pfeifferi*, Mexico" which he noted at the time as near *Lemaireocereus treleasei*.

Monvillea cavendishii. (See page 21, *ante*.)

Related to this species is the following which we know only from description:

CEREUS CHACOANUS Vaupel, Monatsschr. Kakteenk, 26: 121. 1916.

Erect, 2 to 4 meters high, 6 cm. in diameter; ribs 8; spines 9 or 10; central spine solitary, 6 cm. long; flowers funnelform, 15 cm. long; outer perianth-segments rose-colored; inner perianth-segments white; fruit subglobose to ovoid, 3 cm. long.

Type locality: Gran Chaco, Paraguay.
Distribution: Paraguay.

Cephalocereus hoppenstedtii. (See page 27, *ante.*)

A wonderful display of this plant is shown in the photograph taken by C. A. Purpus near the type locality in 1912. A mountainside is shown with many of the plants which form the conspicuous objects in the landscape.

Cereus hoogendorpii (Monatsschr. Kakteenk. 4: 80. 1894) and *Pilocereus hoogendorpii* (Schumann in Engler and Prantl, Pflanzenfam. 3^{6a}: 181. 1894), only names, are the same as this plant, according to Schumann.

Espostoa lanata. (See page 61, *ante.*)

Our attention has been called to a paper by Vincenzo Riccobono (Bull. R. Ort. Firenze IV. 4: 94. 1919) on the first flowering of *Pilocereus dautwitzii* in Europe and a flower of the plant has also been sent us by Riccobono. This seems to be the same plant as the one collected by Dr. Rose in southern Ecuador in 1918.

Illustration: Gartenflora 22: 115, as *Pilocereus dautwitzii.*

Lemaireocereus hystrix. (See page 86, *ante.*)

Cereus olivaceus, Lemaire, Rev. Hort. IV. 8. 643. 1859.

The plant upon which *Cereus olivaceus* was based came from Santo Domingo.

Lemaireocereus griseus. (See page 87, *ante.*)

Both *Cereus eburneus* Salm-Dyck and *Cactus eburneus* Link (Enum. Hort. Berol. 2: 22) were published in 1822 and to both *Cactus peruvianus* Willdenow (Enum. Hort. Berol. Suppl. 32. 1813) was referred. Willdenow's plant, from the description, suggests a *Cephalocereus* but is referred to *Cereus eburneus* by the Index Kewensis. Link also refers it to Hortus Dyckensis and to Haworth (Syn. Pl. Succ. 179), while Salm-Dyck's description indicates that he had a plant before him different from Willdenow's. The *Cereus eburneus* described by Pfeiffer (Enum. Cact. 90) was certainly a complex, a part coming from Curaçao and a part from Chile. For this reason, doubtless, Schumann (Gesamtb. Kakteen 59, 108) has referred both names to *Cereus coquimbanus* and *Cereus eburneus.*

Leocereus. (See page 108, *ante.*)

Cereus oligolepis Vaupel (Notizbl. Bot. Gart. Berlin 5: 285. 1913) we know only from description. It is evidently not a *Cereus* but it suggests one of the species of *Leocereus* and comes from Campo der Serra do Mel on the Rio Surumu, northern Brazil, the region where these plants are found. It may be briefly described as follows: Plant 1 meter high; ribs 5, 1 cm. high; areoles 1 cm. apart; radial spines 8 to 10, 5 mm. long; central spine 1, 2 cm. long; ovary bearing small scales.

Cereus xanthochaetus Reichenbach (Terscheck. Suppl. Cact. Verz. 4) we know only from the description of Walpers (Repert. Bot. 2: 340. 1843). He describes it as follows: Erect, light green; ribs 7, nearly continuous, compressed above, obtuse; areoles yellowish tomentose; spines 21, slender, yellowish, straight, the upper spines longer than the others.

Heliocereus schrankii. (See page 127, *ante.*)

Related to this species is *Cereus ruber* (Weingart, Monatsschr. Kakteenk. 15: 22. 1905). The flowers are described as orange-yellow, passing into scarlet. It is said to come from Brazil, but no species of *Heliocereus* are known from South America. Weingart (Monatsschr. Kakteenk. 29: 57. 1919) expresses his belief that *C. ruber* is of hybrid origin.

Trichocereus pasacana. (See page 133, *ante.*)

Of this relationship the following species are known only from descriptions:

CEREUS TACAQUIRENSIS Vaupel, Monatsschr. Kakteenk. 26: 122. 1916.

Columnar, 2.5 meters high; ribs low, about 1 cm. high, obtuse; spines numerous, setiform; hardly pungent, unequal, the longest 8 cm. long; flowers large, white, 20 cm. long, funnelform; inner perianth-segments oblong-spatulate; stamens in 2 series, shorter than the perianth-segments.

Type locality: Tacaquira, Bolivia.
Distribution: Southern Bolivia.

CEREUS TARIJENSIS Vaupel, Monatsschr. Kakteenk. **26**: 123. 1916.

Columnar, 1.5 meters high, 2.5 dm. in diameter; areoles broadly elliptic to oval; radial spines 10 to 13, stout, pungent, unequal, reddish brown; central spine solitary, 7 cm. long; flower 10 cm. long; outer perianth-segments lanceolate; inner perianth-segments spatulate.

Type locality: Escayache, near Tarijo, Bolivia.
Distribution: Southern Bolivia.

8. Borzicactus aurivillus (Schumann). (See page 163, *ante.*)

Cereus aurivillus Schumann, Monatsschr. Kakteenk **13**: 67. 1903.

Cylindric, 2.5 dm. high or more, 2.5 cm. in diameter; ribs 17, crenate; areoles closely set, only 5 to 7 mm. apart, elliptic, bearing yellow curly wool; spines 30 or more, nearly equal, short, colorless except the yellow bases; flower from near the top of the plant, somewhat zygomorphic, 6 cm. long; inner perianth-segments obtuse.

Type locality: Probably Peru.
Distribution: Andes of Peru.
Illustrations: Monatsschr. Kakteenk. **29**: 7, 9, as *Cereus aurivillus.*

Oreocereus celsianus. (See page 171, *ante.*)

Restudy of *Pilocereus straussii* may show that it is specifically distinct from *Oreocereus celsianus.* The name *Cereus straussii* was really published by Heese in Gartenflora (**62**: 383) in 1907, although the illustration accompanying it bears the legend, *Pilocereus straussii.*

Illustrations: Möllers Deutsche Gärt. Zeit. **25**: 483. f. 15, as *Pilocereus celsianus bruennowii;* Schelle, Handb. Kakteenk. 100. f. 39, as *Pilocereus celsianus;* Gartenflora **62**: 383. f. 55, as *Pilocereus straussii.*

Cleistocactus baumannii. (See page 174, *ante.*)

Of this relationship is the following:

CEREUS TUPIZENSIS Vaupel, Monatsschr. Kakteenk. **26**: 124. 1916.

Slender, 2 to 3 meters high; ribs unknown; areoles large, oval; spines 15 to 20, subulate, pungent, reddish brown; central spines 2, one above the other, 4.5 cm. long; flower tubular, somewhat zygomorphic, 8 cm. long, pale salmon-colored; outer perianth-segments small; inner perianth-segments broader than the outer; stigma-lobes 8, 4 mm. long.

Type locality: Tupiza, Bolivia.
Distribution: Southern Bolivia.

5a. Hylocereus venezuelensis sp. nov. (See page 186, *ante.*)

Vines rather slender, climbing, bluish, 3-angled, the joints 3 to 4 cm. broad; margin of ribs not horny; spines 2 or 3, short, stubby, brown to black; flowers very fragrant, large, 2.5 dm. long; scales on ovary and perianth-tube green with purple margins; inner perianth-segments large, oblong, white above, pink below; stigma-lobes cream-colored, deeply cleft.

Collected by J. N. Rose near Valencia, Venezuela, in 1917 (No. 21835).

We were at first disposed to refer this plant to *H. polyrhizus* but when it flowered in the New York Botanical Garden in June 1920, it produced a flower strikingly different in its stigma-lobes, which are deeply cleft as in *H. lemairei.* In *H. polyrhizus* the stigma-lobes, so far as we know, are always entire. According to W. Weingart, a keen student of these plants, *H. lemairei* and *H. monacanthus* are the only two species he knows with bifid stigma-lobes; they may also occur in *H. bronxensis.*

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